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EDITORIAL NOTES—GAS, &c.

Gas Legislation in the Present Session.

IT is a strange fact that the Government Departments in their reports upon Gas Bills should evince a proneness to meddle with matters that can have little concern for them. In the present session, in connection with Gas Bills and Provisional Orders, both the Local Government Board and the Home Office (as indicated in the opening paragraph of last week's article), while admitting the existence of precedent, have pointed to the appearance of stand-by clauses in gas measures as unusual. It may be quite true that they are so; but we are hoping to see them, as usual, in Gas Bills as they are in Electricity Supply Bills and Orders. The Departmental Authorities, however, consistently upon each occasion made their point. And there it ended; for not in any single instance do we remember a Committee this session ruling-out from a Gas Bill any application for stand-by clauses. The matter was pointedly raised more than once before the Unopposed Bills Committee; but Mr. Emmott and his colleagues saw no reason whatever for disallowing the clauses. We see every reason for granting them in one shape or another, and to the fullest possible extent, for exercise should occasion require in obtaining some measure of return for capital and other expenses incurred in connection with such "stand-bys." We have several times discussed this matter, and pointed to the changes that have occurred in the circumstances of gas supply since the compulsory service conditions were imposed in the Gas-Works Clauses Act of 1871. The stand-by clause is a change necessitated by changes, which have brought the uncontrolled producer gas and suction and pressure gas plants and oil-engines, as well as electricity supply, operating against town gas. This being so, we believe in stand-by clauses (to be used when protection is needed) that will comprehend both private gas plants and electricity. The Heywood Act of a few sessions ago gave us the original clause that embraced both comprehensive forms of competition—private gas plants and electricity; and we cannot see any good reason why, in the Swansea Bill this session, there should have been any modification of the clause, so as to eliminate from its operation, domestic consumers who use electricity and keep gas in a secondary position as a stand-by. Heywood has shown how to deal with small consumers by making a tariff of stand-by charges according to size of meter, which charges are not leviable if the consumption is equal to the proposed charge in a quarter. We cannot see any reason for having deprived the Swansea Gas Company of a power, so easily amenable to regulation, that is fair to all concerned. This a matter that was discussed in our "Correspondence" columns on May 30 last (p. 609).

For some years past, county councils have been doing their level-best to bring gas undertakings under new obligations in regard to the subterranean usage of the roadway; and their aims have been peculiarly one-sided. In short, they have wanted autocratic powers of command and supervision, with the gas undertakings doing all the paying, even to the expense of the damage sustained by their property beneath the road surfaces through the extreme operations of the councils. This session has been particularly marked by excessive zeal and demand on the part of county councils in this respect; and there has been no secret made of the fact that every additional twist of the screw that can be obtained in connection with one gas company will be used to secure similar application in the case of others. There must be strenuous resistance against all this; and for what they have done in the current session, thanks are due from the gas industry at large especially to the Tamworth, the Enfield, and the Uxbridge Companies. They made successful stands against the proposed oppression and imposition of, variously, the Staffordshire, Warwickshire, Middlesex, and Hertfordshire Councils. It is a long tale as to what the Councils required; but it will all be found set out in "Notes from Westminster" as published from time to time during the session, as well as in our parliamentary reports, in an article by Mr. Arthur Valon on special road clauses in Gas Acts in the "JOURNAL" for July 4, and in one on the depth of gas-pipes by Mr. W. R. Herring in our issue for March 28. While there was some difference in form, there was not in substance between the spacious demands of the Councils. They were all extraordinary from beginning to end. The Hertfordshire Council were the most persistent with their application for a steam-roller clause to exempt them from all liability for damage occasioned to any gas-pipes by rollers that did not exceed 15 tons in weight. We think their ideas at one time went as high as 20 tons. And, if there was one council more than another who tried to score off a gas company, no matter in what way, was the Middlesex Council in the case of the Enfield Company. Parliament, as said in last week's article, can be just as well as capricious, or rather inconsistent; and Parliament was just in these cases.

There are several minor matters of interest, which will come up for notice when we have the prints of the Acts before us for review. One noteworthy change has been made in the form of the special purposes fund clause as applied to the Gaslight and Coke Company. It was really brought about by their agreement with the London County Council; and Parliament endorsed it. Instead of 1 per cent. appropriations, and a limit to accumulation of a sum not exceeding one-tenth of the capital, it was agreed that the 1 per cent. and the one-tenth should be halved; while the carry-forward should be unlimited. But this must not be taken by anyone in the light of a precedent. The arrangement was only allowed under the special circumstances of the Gaslight and Coke Company, with their enormous capital, large requirement in the total for dividend, and extraordinary dealings in point of magnitude One question discussed in relation to this change was: Should loan capital be included as capital in calculating appropriations and total accumulation for the purposes of the fund? Speaker's Counsel (Mr. Ernest Moon, K.C.) thinks lawyers would say it should not be; Mr. Corbet Woodall is of the contrary opinion. We agree with the latter, so long as the loans have existence and some representation in assets. But common-sense and the law do not always harmonize.

A Limited View.

ONCE more attention has been called to the important subject of the prospective exhaustion of our coal supply. Once more warning has been uttered as to the misery and sufferings of posterity through the prodigality of the present. Once more appeal has been made, by a voice to which eminence in scientific attainments and benefit to the world impel us to listen with respect, for a greater consideration for the future, and for a compulsory economy and the ending of the sacrifice of energy to crude and traditional usage. The warner and the appellant this time is Sir William Ramsay, the President of the British Association; and warning and appeal come to us through the channel of his address to the *savants* assembled from all parts of the universe at Portsmouth last week. So unlike Sir William (who is optimistic in most things, who looks upon all that is around him—the very atmosphere that we breathe—as an inexhaustible mine from which wealth by the aid of science is to be drawn) is his pessimism in this matter. He seems to have been fully persuaded that there are evil days in store for this country if something is not done, and that very quickly, to conserve our stores of energy. But as a man of science, as one who is ever searching the unknown for something new, and for something that will yield tangible benefit to the human race, we think that here he is found taking the narrow view, and withholding from progress and discovery any likelihood of further substantially contributing to the saving of the country some 175 years hence from the danger that in his large mind he pictures besetting it. He suggests

means of relief; but his means only offer to us the cold comfort of being able to leave on record for the admiration of posterity the fact that we did something to save the prospective dire situation by an artificial arresting of the waste—and it is still not inconsiderable—of the present day. A much broader view is desirable in this matter.

Sir William estimates that our coal supply—that is to say, the cheaply obtainable supply—will be exhausted in 175 years. That is bringing the vision of the trials and troubles of our successors into close sight of the present. We shall not feel those trials and troubles, nor can anything but sympathy, a patriotic feeling, and a desire to leave behind a good name for prevision in regard to the future destinies of our country, induce us to trouble ourselves in the matter. However, we owe something to our country, and to those who will claim us as their ancestors. We recognize that the future commercial supremacy of our country, its power of competing with other nations, its protection from famine and misery hereafter, depend largely upon the conservation of our native store of energy; but we also recognize the potentiality of progress in its relation to the future, and the extent to which progress is dominated by the wise use of the power which is placed in our hands to exercise in the present. Therefore, we regard the matter seriously; and the first criticism that has to be made is that Sir William only takes count of the visible and readily worked coal supply as the basis of his warning and appeal. He does not give the country credit for holding any as yet undiscovered stores; and he does not see, by applying present knowledge to the measuring of prospects, any way whereby other possible sources of energy can be economically utilized to supplement and to thereby secure the economy of our present main store of energy. From Sir William's standpoint, the prospect is a most unhappy one. We may, however, still hope that the future will reveal fresh native stores that may be economically tapped.

We are bidden to forecast by the present signs and to control the future in some way for the benefit of the human race. It is suggested that there should be an annual stock-taking of our coal supplies. There is no objection to that. Legislation is also put forward as a controlling factor. There is no objection to that within limits. The search for greater economies is also touched upon—but lightly; and it is in this and in the effects that we think Sir William failed to do himself and the future full justice. We cannot regard this matter from any hypothetical point of view that finality in economical use has already been reached, or is approaching. That would be absurd. It is admitted by Sir William that during the past century great progress has been effected in the conversion of one form of energy into others with as little useless expenditure of fuel as possible. That is true; and the past quarter of a century has been more prolific in the replacement of waste by economy than any of the three quarters preceding. We have seen this in the gas industry; we have seen it more in the past five years. We have seen in certain large works a much greater output of gas on a much lower proportional consumption of coal. We have seen the same thing latterly in the electrical industry; we have seen the economy developed by science in connection with the coke-oven and the iron industries. We know that what is being done through the more economical use of coal by the gas industry, and in other directions, is displacing coal barbarously used in industrial and domestic service.

This is all progress, and an aid to the conservation of our stores of energy; and such radical changes in method, and the production of economy, will do more, and that more will be done faster, than any form of compulsion to promote the end in view. We must do nothing to stop the progress of industry through any inflexible laws. The ultimate result might be a greater evil than the present gain. If we did aught to put a spoke in the wheel of progress by having only a single eye to the protraction of the day of coal exhaustion, posterity might have cause to curse instead of to bless. We cannot tell what progress, through the yield of scientific thought and research, has in store for us. The liberty of progress must not be interfered with in any way. If so, we may do an irretrievable wrong to posterity. Looking around, we are making vast strides in the economical use of our stores of energy. Said Sir William: "As charity begins at home, and as I am speaking "to the British Association for the Advancement of Science, "I would urge that our first duty is to strive for all which "makes for the permanence of the British Commonweal, "and which will enable us to transmit to our posterity a "heritage not unworthy to be added to that which we have "received from those who have gone before." We are doing much in these days, by combating waste by progressive means, to swell the heritage that will be transmitted to posterity; and, though the work in some directions may be slow, posterity will have no cause to revile the people of the present for what they did in promoting the very objects for which Sir William so eloquently pleaded.

A Momentous Position.

THE times in the industrial world are of the most momentous. The past week has left no manner of doubt in the minds of all who seriously consider the omens that we are at the brink of very tempestuous days in connection with labour. We are not in pessimistic mood, nor do we despair of a new condition of things being eventually created that will bring about a more felicitous condition of things than that of which we can boast to-day. The resources of intellect are not yet exhausted; and the ultimate formulation of a proper scheme is only a matter of time, which cannot fail to be hastened by the violent and chaotic forces that are being brought to bear upon the unhappy and uncertain conditions of the present. It has been made quite clear that there is no stability of the present conditions, under all the schemes—save one—that have been produced with the view of maintaining industrially a clear sky. The hypothesis that arbitration and conciliation were the paths to lasting peace has been shown to be ill-founded by the insurrection and costly effects of the past few weeks. Mere agreements framing definite conditions have been violated with the same ease as one can break down a silken cord put up as a barrier to progress. Honour in these matters has been unscrupulously and scornfully disregarded as a matter of no moment. In fine, there has been a universal failure of pacification schemes except, we repeat, in the one well-known direction.

What is wanted is initiative—a power of adapting the proper course (as recognized in the gas industry) to all sorts and conditions of employment. But what do we see as the highest form of enhancement of the present conditions that our legislators can devise? Nothing better than an attempt to affix new braces and supports to the fractured structure of arbitration and conciliation. As was seen in last week's "JOURNAL," a Labour Disputes Bill has been introduced into Parliament backed by Unionist, Radical, and Labour members, with the view of improving the machinery by which the settlement of labour disputes may be effected by Boards of Conciliation and Investigation to be duly appointed by the Board of Trade. We have nothing to say against the principles of arbitration and conciliation. We are strongly in favour of them, and would welcome them as one means to a devoutly desired end, were they effective. But they have as processes contributing to that end proved themselves inadequate; and the patching-up by the proposed Bill cannot have any permanent effect. Almost simultaneously with the publication of the terms of the Bill, the Royal Commission that is now sitting to inquire into the working of the Railway Conciliation Scheme of 1907 were being told by one important Union witness that he did not see (there are none so blind as those who will not see) any effective course that could be adopted to prevent stoppages of work. If an arbitration award "was not acceptable to the men, what has occurred "this time would occur again." The Commission have been informed as plainly as the leaders of the men can inform them, that arbitration is not required because the men are dissatisfied with it, and find it a costly instrument, and not a very effective one, for the realization of their demands. To them, it is not the same thing as the more brutal method of bringing about such a stoppage that the trade of the country is absolutely paralyzed, labour is demoralized, and the whole country is made to bear the penalty in several caustic ways.

The power to strike it is desired to retain unimpaired, and added to it now is the new policy of attempting to beat down resistance to demand whatever its character by the force of numbers and spreading the effects with a heavy hand. In this new Labour Disputes Bill, the process of arbitration is only intended to be a sort of trial to ascertain what may result, and not a compulsory method of settling disputes and arranging grievances. At the back of it all is to hang the uncertainty of a strike or lock-out. Under clause 37, we see that "either party to a dispute which may

"be referred under this Act to a Board, may agree in "writing, at any time before or after the Board has made "its report and recommendation, to be bound by the recom- "mendation of the Board, and such recommendation shall "be legally enforceable." But under section 32, "except "where the parties have entered into an agreement under "section 37 of this Act, nothing in this Act shall be held to "restrain any employer from declaring a lock-out, or any "employee from going on strike, *in respect of any dispute "which has been duly referred to a Board*, and which has been "dealt with under section 13 of this Act." So that this is only to be arbitration in a very limited sense, to ascertain what may happen, and then for the use of the uncivilized form of industrial warfare to come into operation if the decision does not satisfy. When will it satisfy, if the full demands of the section of labour dominated by those trade unions governed by ultra-socialists are not awarded? There are not two answers to the question. The more we study the events of the past twelve or eighteen months, the more convinced are we that arbitration and conciliation as applied to union-controlled labour is impotent for lasting good.

We see it further and vividly reflected in the announcement made last week that, at the conference of the Miners' Federation in October, a resolution is to be proposed in favour of a national strike, in order to enforce the demand for a minimum wage. Serious observers have detected this coming for some time. Others have refused to see it. The coal miners have never been enamoured of the terms arranged for them by their representatives and the coal owners in 1909; and the Mines Eight-Hour Act has proved an additional source of unceasing irritation, and is likely to continue so even with well-intentioned amendment. There has been nothing but seething discontent; and here is the threat to bring about a thorough industrial eruption. If upwards of a million miners struck work, and the output of the coal mines of the country were restricted by 850,000 tons a day, without a speedy resumption of work, the whole of the industry of the country would be imperilled, and labour of all kinds would be involved. Coal owners would resist the application for a minimum wage. They could not afford to do otherwise. We hope wise counsels will prevail. But the ominous announcement shows the want of durability in the generally applied schemes for promoting peace in the labour world. It is also a warning that will not be lost on those who have to look after the winter's reserves that stand for continuity of supply of the prime commodity of the gas industry.

The Measurement of the Industry.

NOTHING has statistically emphasized the importance of the gas industry so much as the Blue Book which has just been issued under the Census of Production Act of 1906. This particular issue is of more value than any of its predecessors; and we congratulate those responsible for the work of collection, compilation, and digest on the result of their labours, and the interest and value attaching to it. Every care has been taken in the work; but in view of its vastness, and of the fact that it is initial, no one will feel disposed to be hypercritical over the results, or question them. The data may be accepted, with faith, as approximately correct; and it may further be taken that the experience obtained on this occasion will form a good foundation for greater accuracy at the next census.

The section of the present return relating to the gas industry is of considerable value in that the statistics give, within limits, a more complete view of the position of the gas industry than the Board of Trade returns. These were always deficient, referring as they do only to statutorily controlled concerns. Here we have non-statutory undertakings brought into the reckoning; and the figures appearing in the Board of Trade returns are thus materially enlarged. But there is not much room for comparison between this return and those that have long been the authoritative and acknowledged ones, seeing that the former gives much more information concerning the work of the gas industry in the aggregate (though not in the individual sense) than the latter, which, in turn, impart information appertaining to matters in connection with statutory gas undertakings that are not included in the present document. The features that are particularly welcome in this return are that non-statutory gas undertakings are embraced, that there are statistics as to the labour employed, and that the quantity and value of the bye-products are included. Altogether, the measurement of the standing of the gas industry is more complete than it has ever been before.

We may return on a convenient opportunity to a fuller examination of this return (the gas section of which is published in other columns to-day); but on this occasion we will satisfy ourselves by a comparison to show the relative positions of the gas and electricity industry. Under the head of gross output, selling value, or value of work done, the gas industry claims £31,607,000; the electricity supply industry, £8,903,000. The value of the materials used in the gas industry is given at £14,329,000; and in the electricity industry, at £3,335,000. The net output is therefore, for the gas industry, £17,278,000; and for the electricity industry, £5,568,000. The labour employed in the gas industry totals to 83,531—that is, so far as the returns allow calculation to be made; but it is admitted that there has been omission in several returns of members of the outdoor staff—the collectors, inspectors, and so on. The electricity industry only employs 22,618 persons. It is not clear whether the statistics as to electricity stations include or otherwise those parts that are utilized for tramway service. However, relatively, we are well content with the position of the gas industry; and may its difference in bulk long continue—and, more, expand.

The Inquiry-Circular Nuisance Again.

Seekers for information "on the cheap" by means of the inquiry-circular do not seem to be deterred by the condemnatory remarks on the practice which have from time to time appeared in the "JOURNAL," and been cordially supported by the sufferers from the annoyance, from again resorting to it. A correspondent forwards copies of two circulars he has just received emanating from the same source, and making a total of at least ten sent out by the same individual during the past three years. These last two ask for certain particulars in regard to show-rooms and the letting of gas appliances on hire. It will interest readers to see the nature of questions, as reproduced in our "Correspondence" columns to-day.

Australian Progress.

From the Melbourne Gas Company there comes an excellent report of progress in the consumption of gas. At the meeting of shareholders (an account of which appears elsewhere), the Chairman was able to make the gratifying announcement that the total sales of gas during the six months to June 30 amounted to 998,193,000 cubic feet, which represented an increase of no less than 13¼ per cent. over the corresponding period of the previous year. It is true that a portion of this increase is attributed to an exceptionally cold and wet season; but even so, the result is an extremely satisfactory one, and proves that nothing is wanting on the part of those responsible for the administration of the undertaking to popularize the use of gas for the many purposes for which it can be advantageously employed. For one thing, the benefits of cooking by gas are kept prominently before the public; and of the efforts made in this direction proof is given by the fact that no less than 3718 new stove consumers were placed on the Company's books during the six months. This is stated to be a very large number for the period of the year ending at June. Claims for higher wages are not only heard of on this side; for we learn that the Melbourne Company, together with other large employers of labour, have met the demands for all-round increases in the rates of pay to employees; and various items on the expenditure side of the balance-sheet exhibit a rise owing to this factor. The extent of the influence this matter will exercise on the Company's accounts may be seen in the remark that the cost of manufacture and distribution and the handling of residuals, &c., has been increased by £25,000 per annum—which sum is being paid to the employees of the Company in the form of increased rates of wages, &c.

The Lesson of a Strike.

Following on several meetings of the men last week, an end has, it may confidently be assumed, at last been reached of the extraordinary miners' strike in connection with the South Wales collieries of the Cambrian Combine. This is good news. But before the matter is—finally, it may be hoped—relegated to the past, it may be well, as a guide to the future, to glance for a moment at the results of the stoppage. These are set forth by

the "Western Mail," which says that while, in the main, the strike, which has upset the trade of South Wales for practically twelve months, has undoubtedly had a harmful effect, especially in the direction of frightening business away from the district, certain benefits have accrued from the disaster, though these have not come to the parties most interested—the combine and their workmen—who may, however, probably have learnt valuable lessons which will prevent the repetition of the mistakes of the long period of stoppage. The strike affected nearly 12,000 men, of whom 2000 were idle about a year, and the remainder for ten months. The South Wales Miners' Federation and the Miners' Federation of Great Britain have been taught in an unmistakable manner the disastrous consequences of a big strike on a bad case against resolute employers; and the lesson of this is not likely to be forgotten for some time to come. The funds of the South Wales Miners' Federation have been entirely exhausted, while serious inroads were made into those of the parent organization. It is added that the experience should be valuable to the miners' leaders, who are able to point out to the men—who for ten months carried on a bitter strike rather than accept the terms arranged by their own representatives, and which eventually they agreed to—the folly of throwing aside discipline. In this way, the check may be the means of saving further disaster. The opinion is expressed in the article that very probably the resolute action of the employers has been the means of saving South Wales from a general strike. Before the Cambrian struggle began, a general strike seemed imminent; but now many of the leaders and a large proportion of the workmen realize that to pursue the policy of a general strike in South Wales at the present juncture would be suicidal. If, it is remarked, a general strike has been averted in the manner shown, the Cambrian stoppage has been of benefit, not only to the coal trade, but to the dock and shipping companies, and all other interests dependent upon the maintenance of the industry. Indirectly, the strike might even be regarded as a blessing to the general community. Thus it would seem that out of evil good may come. During the continuance of the dispute, the Cambrian Combine have apparently been receiving from the Associated Collieries an indemnity of something like £1000 a day. But even so, our contemporary calculates that the combine have not done so well as they would if the pits had been working during the period of good trade lately experienced, while it will take a long period to restore the normal output, and meanwhile the undertaking must be worked under great disadvantages.

Wiser Counsels Prevail.

But at the very moment when the Cambrian dispute was being brought to an end, trouble was brewing in another quarter, though serious consequences have happily been averted, for the time, at any rate. At a mass meeting of the workmen employed at the collieries in the neighbourhood of Porth, it was resolved to appoint a Strike Committee empowered to take steps to act on the lines of the railway men and seamen. In accordance with the instruction of the meeting, all the lodges of the South Wales Miners' Federation were circularized, and a manifesto was issued. About two-thirds of the replies received were, it is said, favourable to the convening of an immediate conference in connection with this suggested promotion of a strike policy in South Wales for the purpose of securing a guaranteed minimum wage for all colliery workers. It was therefore arranged that an unofficial coalfield conference should be held at Cardiff on Saturday. But before the time for it arrived, the Committee announced their decision that the replies received were not sufficiently numerous to justify the conference being called; and so it was cancelled. The issue of the "South Wales Daily News" which contained the intimation of the abandonment of the conference had in it also a long appeal from the Right Hon. W. Abraham, M.P., who implored the men to do nothing "so rash, useless, and disastrous" to themselves and to the South Wales community at large as to embark upon an immediate strike for a minimum wage. His view is that the stoppage of the collieries in the South Wales coalfield would not lead to the establishment of a minimum wage, but would more likely than anything else isolate the coalfield from all others in the kingdom, and leave its workers without any participation in the general movement that the Miners' Federation of Great Britain have taken in hand. It is expected that at the annual conference of the Federation next month a resolution agreeing to take common action regarding abnormal places and rates of pay will be carried and put in force, if satisfactory arrangements are not meanwhile arrived at. This would seem to show that the trouble may not be ended, but merely "shelved." To the attention of Trades Unionists generally the following passages of Mr. Abraham's appeal may be specially commended:

> Fellow workers, one need not blink the fact that serious injustice and danger to all will arise if an irregular strike without notice should happen now. The fact is, and it cannot be insisted upon too often, that strikes without notice, if they became much practised, would end in ruining Trade Unionism. If breaches of contract, such as an immediate stoppage of the collieries in South Wales would involve, were but even infrequently acquiesced in by Trade Unionists as a regrettable necessity of war, the privileged position enjoyed by the Unions since the Trades Disputes Act, in their immunity from actions in tort, could not possibly be defended. But not only that, their powers of bargaining would go as well as their privileges. Recognition, collective bargaining, loyalty to general agreements made on behalf of the men, as well as particular terms of service, are all parts of the same structure. We cannot have both recognition and assert a right to break contracts and strike without notice. These may be by some considered to be the commonplaces of the Trade Union spirit; but even Trade Unionists need to be reminded of them, especially when some Trade Union leaders are preaching the doctrine that force is the remedy, and that strikes can be fought without money.

Domestic Hot Water Supply.

An interesting little article on this subject, by Mr. R. Herzfeld, appeared lately in the Engineering Supplement of "The Times." It would have been more interesting still had it divulged on the part of the author a closer acquaintance with what is being done in connection with water heating by gas, and if it had not ended in a suggestion that is impracticable and uneconomical, in comparison with the system of heating water where it is immediately wanted. He favours the old idea of distributing hot water from a central station. The loss that must inevitably result from such a system is quite sufficient to kill it; but Mr. Herzfeld considers the scheme is one that "should especially appeal to gas and electric lighting companies, who labour under the difficulty of ousting the coal-fired kitchen range so long as the generation of hot water is not made a business quite separate from cooking. The separation of these two processes would greatly facilitate the introduction of the gas or electric stove for cooking proper; and the provision of a small heating-stove for use in the winter evenings would effectively meet one objection which might be put forward—that the kitchen range is really necessary for heating as much as for the preparation of the meals." Now, this exactly describes what is being done by gas authorities in the matter; so that Mr. Herzfeld has unwittingly supplied the answer to his argument in favour of central water heating. But a good point of the article is as to the cost of the provision of hot water by the coal range. Few, if any, householders realize what the lighting and upkeep of a fire means in cost in proportion to the hot water used. If they did realize it, we venture to think they would soon turn to such a convenient way of heating water as is provided by the gas circulating-boiler and other means, which can be brought into use and be discontinued just as needed—the consumption of fuel only proceeding when the water is actually required; and when it is required, plenty of it can be had promptly. The economy of this system is found by comparing it with the wastefulness of the coal system. For water heating, electricity is a bad proposition. Mr. Herzfeld should make himself acquainted with the extent to which the gas-cooker has displaced the coal kitchen-range, and how water-heating by gas is progressing.

Fair Wages Clauses in Contracts of Local Bodies.—The Local Government Board have just issued a circular to local authorities, drawing attention to the recommendation of the Advisory Committee of Representatives of Government Departments with reference to the fair wages clauses in contracts. The Committee recommended that clauses such as those inserted in Government contracts should also be introduced into those which involve the expenditure of public money granted by a Government department, or which require their approval. The circular said: "It appears to the Board that the policy adopted in the case of Government contracts should be followed in the cases of all contracts for the execution of works or the supply of materials which are entered into by local authorities or by or on behalf of any committee wholly or in part appointed by a local authority. While they are aware that many local authorities specify in their contracts conditions to be observed by the contractor as to rates of wages and other matters affecting persons employed by him, the Board think that in every case the authority should give the matter careful consideration."

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 613.)

THERE was little in the course of affairs on the Stock Exchange last week from which any one could extract any satisfaction; and the general tone was one of apprehension and sensitiveness, ready to take alarm upon very moderate provocation. For this, Moroccan affairs and the great Labour question were chiefly responsible. It was account week, and the settlement was looked forward to with some anxiety; but apparently it went through without any catastrophe. Home Railways, however, had a heavy fall. The opening day was languid and dull. Consols fell $\frac{1}{16}$. Railway prices shrank nearly all round; and Americans see-sawed about vaguely. Business on Tuesday continued very quiet; but the tone was not quite so heavy. The leading markets did not mend; but Americans made a recovery. Foreign were firm; and there was some animation in speculative lines. The feature of Wednesday was the big drop in Rails, owing to strike fears and the closing of some weak accounts. Home Government issues were lowered by uneasiness as to foreign relations. Americans fell back again; and Foreign were rather shy. On Thursday morning, Rails fell still lower; but later in the day the tendency amended. Consols closed $\frac{1}{8}$ higher; and the leading markets were better generally. Friday opened pretty firm, but straggled as the day advanced. Consols were a weak spot; but Rails were cheered by the Great Eastern settlement. Saturday was but little changed, except for weakness in some speculative lines. Consols closed at $77\frac{5}{8}$-$\frac{7}{8}$ *ex div.*—a fall of $\frac{1}{8}$ in the week. In the Money Market, there was a fair demand for the Stock Exchange and the month-end, and discount rates hardened. Business in the Gas Market aggregated about the same as the week before; but it was more largely distributed through the list of undertakings. The strength of the market was yet more abundantly evident; a large number of additional advances in quotation being established, and without any counterbalancing retrogression. In Gaslight and Coke, the ordinary had its full share of attention, and was very firm, marking from 106½ to 107; but the quotation was left standing unadvanced. In the secured issues, the maximum realized 84½, the preference 102½, and the debenture from 79 to 81—a rise of ½. South Metropolitan was quiet and unchanged at 116½ to 117½. The debenture marked 79¾. In Commercials, there was only one bargain in the 4 per cent. at 113. Among the Suburbans and Provincials, Bournemouth "B" was done at 16⅜ *ex div.*, ditto preference at 14⅜ *ex div.*, British at 45⅝, Brighton original at 221, ditto ordinary at 161, Portsea Island "B" at 123, Southampton at 108½, and South Suburban at 118¼ and 118¾. In Continental companies, Imperial marked from 181¾ to 182¾, ditto debenture 90, European 19⅜ and 19 5/32, and Tuscan 9 and 9⅛. Among the undertakings of the remoter world, Honkong changed hands at 17⅜, Primitiva at 7¼ and 7 7/16, ditto preference at 5¼ and 5⅜, San Paulo at 21 13/16 to 22⅛, ditto preference at 12⅛, and ditto debenture at 49¾.

ELECTRICITY SUPPLY MEMORANDA.

Official Statistics—Electricity and Gas Consumers in the Metropolis—Public Lights of London—Various Classes of Consumption and Revenue—Miscellaneous Items—Relation of Electricity and Gas Capital to Revenue—The Paragon Electrical Canvasser—Purifying the Atmosphere—When on Common Ground.

OTHER matters having demanded attention lately, we have had to defer the interest to be derived from the examination of the annual return of the London County Council relating to electricity supply undertakings. It is a very handy return; but the wish naturally rises that it was a little more up to date. The Board of Trade have made their returns relating to gas undertakings of much more value by bringing their issue into closer relation with the period to which each return refers. The London County Council might do likewise. The return before us covers the year 1909-10. Much water has flowed under the Thames bridges since then; and many other things have happened which may, in some measure, have altered the complexion of things electrical. But still the statistics are of use for comparison purposes, as they indicate the trend, if not the exact position, of present affairs. It is first remarked that the number of consumers possessed by fifteen Borough Council undertakings was returned at 33,920, which is about 3000 more than the preceding year. Concerning the thirteen Companies, we cannot exactly tell how the year progressed in this regard with them, seeing that, on this occasion, the County of London Company do not make a return, while last year the Charing Cross Company kept to themselves their number of private consumers. If we accept the figure now obtained for the Charing Cross Company, and take last year's figure for the County of London with an increase on it of (say) a couple of hundred, the total of the customers of the Companies is only about 78,300, which is an increase of approximately 2500 consumers on the previous year's figures. Thus, the 28 undertakings could only number between them 112,220 consumers at the end of the period upon which report is made; while the three London Gas Companies alone—not reckoning those of other Companies partly within the Administrative County of London and partly without—could, at the close of last year, boast of approximately 1,120,000 consumers. This is extremely interesting. But another fact that arrests attention is that, in the return now before us, the Kensington and Knightsbridge Company and the Metropolitan Company both actually show a set-back. The first-named Company is credited with having 4149 consumers; a year previously the figure was 4350. The Metropolitan in this return figure for 10,234 consumers; twelve months since the claim was 11,500. Some explanation appears to be required here.

But perhaps the most interesting part of the statistics alludes to public lighting. The number of arc lamps in the districts of the electricity supply Borough Councils was 4775; but in the districts supplied by the Companies, there were only 1768. This tells a tale, which is emphasized by the number of incandescent electric lamps in use—in Borough Council electricity supply districts, 5638; and in Company supply districts, 213. That is to say, at the end of the period, the Borough Councils in the districts of the thirteen Companies had, all told, only 1981 electric lamps in use, or an increase of 54 during the year (accounted for by the experimental lamps in the City), while the Borough Councils who "manage" electricity supply undertakings have a total of 10,413 electric lamps in their areas, or an increase of 2345. We reiterate that this tells a tale. The increase is entirely a metallic filament lamp one; there having been, as a matter of fact, a reduction of 84 arc lamps. The principal contributors to the increase in metallic filaments are Marylebone, Fulham, Hammersmith, and Hampstead. An actual reduction of arc lamps in the streets of the Metropolis shows which way the wind is blowing. Though the efficiency of the metallic filament lamp is not so high as that of the arc lamp, and though the renewal expenses run somewhat heavy, the costs of labour and upkeep in connection with the arcs make the metallic filament lamp the greater favourite with those lighting authorities who (this must be kept well in mind) also run electric supply concerns. The arc-lamp makers are not particularly pleased with the way things are going with them in connection with street lighting and outside shop lighting. What with high-pressure gas lighting, the modern types of inverted burner, and the electric metallic filament lamp, their street lighting trade is being gradually, but surely, throttled. While, however, we see that, for public lighting in the streets of London, the end of the period under review found the electrical industry with, all told, 12,394 lamps—arc and metallic filament—the three Gas Companies at the close of 1910 had 74,517 public lamps to their credit.

But we have a further significant point in connection with the public lighting; and this "gives away" the game of municipal management in the interests of the electricity undertakings, and not in those of the ratepayers. We compile from the return the following, which bring aggregate consumptions and revenue in the electricity supply areas of the Borough Councils into close relationship.

	Units Sold.		Revenue.
Street lighting (revenue including maintenance)	11,711,637	..	£110,360
Other municipal lighting	1,108,442	..	13,516
Private consumers for lighting	31,911,458	..	446,345
Power and heat for municipal purposes	948,351	..	4,102
Private consumers for power	28,445,205	..	131,410
Traction	990,875	..	4,128

It will be observed from this that electricity supplying Borough Councils draw from the ratepayers no less than £123,876 for public lighting and other purposes to which they put electricity. It will be seen, too, how the private lighting consumer fares under the present tariffs. If the last three items in the table are added together, it will be remarked that the aggregate consumption about equals the consumption of private consumers for lighting, yet the receipts only total to £139,640, as against £446,345 for private lighting. This seems unfair and disproportionate; and it very clearly shows the extent to which the private consumers have to bear the financial heat and burden of the day. All consumption other than private lighting is in excess of the private lighting by 11,293,052 units; and yet private lighting paid in the year dealt with in the returns £182,829 in excess of all other custom—municipal, power, or otherwise. We do not hear much in these days about those at one time sacred principles (which were never, no never on any consideration, going to be violated) on which tariffs were founded. The figures produced here show how these principles have gone under, and no longer faithfully apply to the conditions as they have developed.

There are three or four more figures that will be of interest. The units consumed by electricity supplying Borough Councils for public lighting are equal to 26 per cent. of the total number sold for lighting; while those Borough Councils in the areas where companies carry on the electricity business are content for public lighting with 5 per cent. of the total units sold for illuminating purposes. Then, again, the fifteen Borough Councils trading in electricity only pay 0·09d. per unit sold in the shape of rates and taxes, while the Electricity Companies are compelled to pay 0·19d. per unit sold. This is not equitable. The total revenue for the year of the fifteen electricity supplying Borough Councils was £724,205; and of the thirteen Electric Supply Companies, £1,658,319—together £2,382,524. The total income of the three London Gas Companies in 1910 was £7,170,207, and in the year before £6,733,207. To obtain a revenue one-third the amount of the three Gas Companies, the electricity concerns have raised capital amounting to £19,889,671, or, deducting the sum repaid by the Borough Councils, £19,094,617. The capital and borrowed money raised by the three Gas Companies total

to £40,158,151; but if we separate from this the sums added on conversion and the non-dividend bearing (premium) capital, the capital stands at £18,249,151, which is less than the amount of capital shown to be employed in the supply of electricity in the Metropolis.

An article has been published in the "Electrical Engineer" from the joint pens of Mr. A. T. Bullen and Mr. H. E. Goody, which article appears to us as being, though much of it is somewhat well-worn, very fair in its character and tone. It is on "Canvassers and Canvassing;" and first of all we have in it the paragon of canvassers portrayed—all the indispensable virtues (including truthfulness) of such an individual are laid bare. It is not sufficient that an electrical canvasser should be on drinking terms with all the electrical contractors of the locality. The insinuation is not quite a pleasant one. He must be well dressed; and he must be a gentleman. A modification is made by the writers of the latter qualification, in the words "or at least have the manners of a gentleman." He may be fluent; but he must know what he is talking about. He "should be"—the words "must be" are not used—thoroughly conversant with the latest electrical developments. He should be a good conversationalist; he should possess not merely good manners, but many manners—observing the apostolic injunction, he should be "all things to all men." To that the canvasser with any self-respect might in these times object. He must (this is excellent advice to electrical canvassers) "avoid exaggeration, as it is to be hoped he does the devil." We have just been reading about the necessary qualification of being a gentleman, or at least having the manners of a gentleman; therefore the reference to his satanic majesty seems superfluous. The points on which there should not be exaggeration are illustrated. "In neighbourhoods where gas is really cheaper, light for light, than electricity, the point should be 'gracefully' conceded [we can picture this being done]; and the canvasser should persuasively emphasize the qualities, such as cleanliness and convenience, which are the universal monopoly of electricity." Those are the words of the writers of the article; they have forgotten already the virtue of truthfulness. "The sort of canvasser who goes about advising people with very small incomes to instal electric radiators and cookers only does harm; for if he is taken at his word, and the consumers instal apparatus which they cannot afford to use, the reputation of the supply company will be damaged by the persistent denunciations of these unhappy persons." Here is a case in point:

An over-zealous canvasser, in conversation with a lighting consumer of the working class, persuaded him to purchase and use an electric radiator. The canvasser assured the consumer that the radiator might be burned continuously at no greater expense than would be incurred for a coal fire. Current for heating costs 2d. per unit in this particular district. The consumer used the radiator in his living room in place of the fire; and he was disgusted to receive, at the end of his first winter quarter, a heating bill of about £10. He could not, or would not, pay the bill. The supply to his house was disconnected; and to this day it has never been re-connected. The company has, in this way, lost irrevocably a consumer who, although small, at any rate gave very little trouble until he made his unfortunate experiment with an electric radiator.

We hope the result of Messrs. Bullen and Goody's article will have good effect. The canvassers of the gas industry will be delighted to meet gentlemen canvassers of the electricity industry who, among their many other good attributes, are truthful. This characteristic alone will make the work of the gas canvasser much easier than it is at the present time, in many quarters.

The electrical industry look with feelings of sharp and profound envy upon the magnificent contribution the gas industry has made towards the relief of the atmosphere from the smoke nuisance. It came as an awful shock to the competitors to learn from the Right Hon. John Burns more than twelve months ago that two of the Metropolitan Gas Companies had then fixed (to say nothing of privately owned ones) as many as 1,300,000 heating appliances of various descriptions, which must have tended largely to purify the atmosphere of London. He acknowledged that legislation could not have effectively done so much as the Gas Companies had succeeded in accomplishing. There is no doubt that these domestic gas appliances had a substantial influence in bringing about the excellent diminution in foggy days shown by the last report of the Smoke Abatement Society:

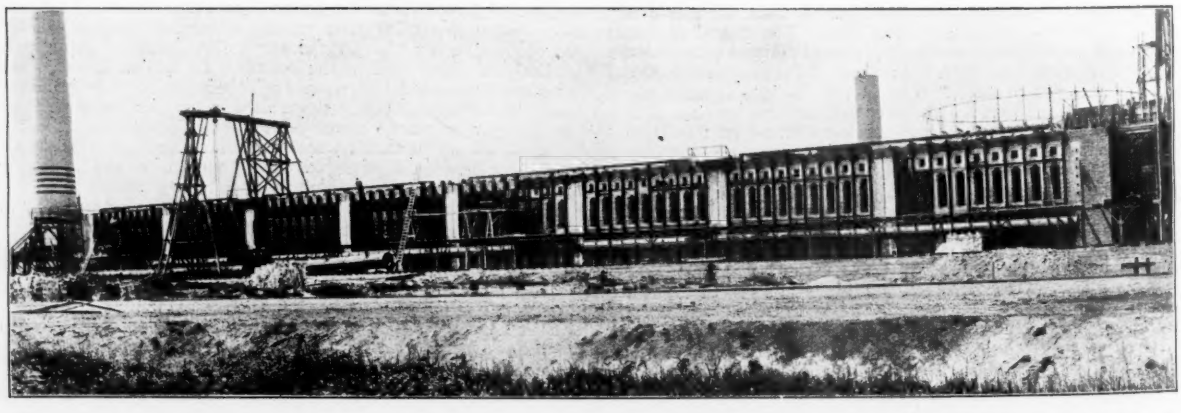
Period.	Average Number of Days with Fog.	Hours of Bright Sunshine.
1883-4 to 1891-2	29·9 ..	55·6
1892-3 to 1900-1	20·7 ..	70·1
1901-2 to 1909-10	10·6 ..	93·5

This is highly satisfactory. For the point we are indebted to a reminder in an article by Mr. John B. C. Kershaw in the "Electrical Review." He very properly places, like Mr. Burns, gas in the superior position among the fuel agents that have rendered service in producing these more healthy atmospherical conditions. His words are: "The domestic chimney, which in the past has been a great offender, has certainly shown remarkable improvement. This is no doubt largely due to the increasing use (for heating and cooking) of gas, electricity, and solid smokeless fuels." How the electricity industry wish they had the power to change places with, and so take precedence of, gas for heating.

But there is that thermal spectre always ranked on the side of electricity, while on the side of gas is a generous thermal value that cannot be disposed of by any process of electrical negation. However, there is a Smoke Abatement Exhibition coming on in Manchester in November next, and in London next May; and the electric appliance manufacturers are being asked to gird up their loins, and assist in demonstrating to the public that electrical appliances, notwithstanding the lower plane occupied by the heating agent in the matter of calorific value, are not more expensive to run than gas appliances, that their first cost is no more, and that the cost of repair is not excessive. Truthfulness is a virtue that electrical exhibition stand attendants should cultivate as well as electrical canvassers. However, gas will be there to protect itself; and the public has not lost all sense of judgment as it is patent some electricians believe it has. It was suggested in the "Memoranda" the other week that the Gaslight and Coke Company should be asked to send a gas cooker and a competent cook to demonstrate, at the Electrical Exhibition at Olympia, the inferiority of the electric cooker side by side with the gas-cooker; but we have not heard that the Exhibition authorities have jumped at the idea. At the Smoke Abatement Exhibitions, the gas cooker and the electric cooker will occupy common ground. There are still weeks in one case, and months in the other, in which the latter can be improved. Will it then show up superior to the gas-cooker in its range of usefulness and economy? We entertain a very confident opinion that it will not.

INCLINED CARBONIZING CHAMBERS IN VIENNA.

Installation at the Leopoldau Municipal Gas-Works.



In the review of the progress of the gas undertaking of the Municipality of Vienna which appeared in the "Journal" towards the close of last year, it was mentioned that, in order to meet the continually growing output of gas, an installation of inclined carbonizing chambers, capable of producing about 1¼ million cubic feet of gas per day, was erected in 1908; and that the following year the installation was enlarged by the addition of 19 chambers; making 34 in all, with a daily productive capacity of nearly 3 million cubic feet. It was also mentioned that further extensions were being made at the municipal gas-works at Simmering; while new works were being constructed at Leopoldau. We give a view of a fine installation of inclined chambers at these works. It has a two-fold interest, as it shows in the background, on the right, the large gasholder which recently collapsed. An account of this accident was given in the "Journal" for Aug. 22 (p. 478), where a better view of the holder will be found.

VERTICAL RETORTS AT HELENSBURGH.

Glover-West Installation Opened.

Readers of the "JOURNAL" may remember that the extensions which have lately been carried out at the Helensburgh Gas-Works, under the supervision of the Corporation Gas Engineer and Manager (Mr. William Blair), comprise an installation of Glover-West vertical retorts of a capacity of half-a-million cubic feet of gas per day, coal-handling plant, gas-engines, and driving gear, and a new coal-store building, covering an area of 9000 square feet, with double-span roof. The following are a few particulars of the installation, to which reference was made in the "JOURNAL" for the 2nd of May last (p. 282).

Arrangements were made with the North British Railway Company to enable the coal-waggons to run direct from the railway siding into the coal-store. The railway track is extended across the store to a point where a hydraulic waggon tipper lifts one end of the waggon and discharges the coal to the mouth of a coal-breaker—thus facilitating the discharge of the coal to the plant. The waggons are weighed on a weighbridge situate inside the store, and there is a turntable to enable them to be diverted to lines leading to other parts of the store and works. The retort-house is constructed of steel stanchions of modern design, with walls of 4½-inch brickwork built in between longitudinal girders and the main principals or stanchions, except on the coal-store side and the main gable end, which are covered in by galvanized corrugated iron sheeting. There are two settings of Glover-West retorts, each containing eight retorts. The arrangement of the retorts in the settings enables any two retorts to be in operation, and consequently the output of the installation can be readily regulated to meet requirements ranging between the minimum and maximum make of gas. In order to provide for economy in working when the setting is on minimum make, each setting is constructed with a twin producer. The retorts were put into operation on the 4th of July, and within eighteen hours after the starting of the plant the retort-house equipped with horizontals was shut down completely, and has remained so since that date; the whole of the gas supply depending upon the output from the vertical retorts.

Opening Ceremony.

The installation was officially opened last Saturday afternoon. About a hundred ladies and gentlemen assembled for the ceremony; the company including many well-known gas managers, not by any means all drawn from West of Scotland districts.

Councillor G. SELLARS, Vice-Convener of the Gas Committee, in the absence, through indisposition, of the Convener (Bailie T. C. Mitchell), extended a very cordial welcome to the visitors.

Mr. F. J. West, on behalf of West's Gas Improvement Company, Limited, the Contractors for the plant, presented a silver salver, with inscription, to Mrs. Mitchell, as a memento of the occasion.

Mrs. Mitchell, through Mr. Sellars, returned thanks. She then manipulated the handle of the hydraulic appliance by which a waggon of coal was emptied into the breaker; and in this way the opening ceremony was performed. The company then walked over the new works, and witnessed them in operation. Tea was afterwards served by the Corporation in the Council Chambers.

Provost MACLACHLAN, when addressing the company, renewed the welcome to those who had come to grace their proceedings, and at his request the Town Clerk read apologies for absence from, among others, Mr. A. Masterton, of Edinburgh; Mr. D. Vass, of Airdrie; Mr. J. Dickson, of Forfar; Mr. A. Yuill, of Dundee; Mr. S. Dickie, of Dumfries; Mr. J. Ballantyne, of Hamilton; Mr. H. Scott, of Galashiels; Mr. G. R. Hislop, of Paisley; Mr. J. Dunlop Smith, of Belfast; Mr. A. Bell, of Peebles; Mr. W. A. Smith, of Hawick; and Mr. S. Milne, of Aberdeen.

Mr. SELLARS said it occurred to him that he might give some little reason for having the new installation they had opened that day. About three years ago they had a report from the Gas Manager, after a very severe winter, that the works had been making up to their utmost capacity. This report led to their giving a little consideration to the matter, and they had a report drawn up as to what it would cost to put the old works in good order, and perhaps add something to them. They found that it would cost about £7000 to patch up the works and give them a little more retort power. They did not go into the matter, as they had other ideas put before them about something which Mr. Blair, who was a very practical man, had thought of. He was well up to date in all the very latest in gas manufacture. They had several systems submitted to them; and ultimately they fixed on that of Messrs. Glover and West, of Manchester, as being something which would be suitable for a place such as Helensburgh. They sent a deputation to St. Helens, where a small installation was then working; and it satisfied them. They had guarantees from Messrs. West as to what the works would do in the way of production of gas per ton of coal. They then proceeded with the installation the visitors had just seen; and he believed that it would turn out to be a very remunerative undertaking. The ground cost them about £1500; and this sum, with the cost of the works, including a railway across the street, worked by hydraulic power, would be all within £15,500. They had had from Mr. Blair a report which showed that they had made more than a million cubic feet of gas beyond what was produced from the same quantity of coal in the old works. He thought they had every reason to be satisfied with their bargain with Messrs. West; and they were much indebted to Mr. Blair for guiding them to that Company.

Mr. F. J. WEST remarked that the tests they had made showed that they had exceeded their guarantees by at least 10 per cent.

Mr. ALEX. WILSON (Glasgow) proposed a vote of thanks to the Corporation of Helensburgh, and asked to be allowed to add to the congratulations to which utterance had been given. In the first place, he said he considered Mr. Glover was to be congratulated on bringing out such a fine idea for carbonizing coal in vertical retorts. Then he was specially favoured in being associated with Messrs. West in carrying out the idea. He thought they might well congratulate Messrs. West on having a good system to work upon. Those of them who had seen it in operation were entirely satisfied with the way in which the installation was doing its work. The system would improve matters very much in the gas-works. It would not only enable them to sell gas cheaper—which was, of course, a prime consideration—but also to do their work under much more favourable conditions than formerly. He was sure they were all charmed with the way in which the coke was drawn, as compared with the days when they had so much dust and steam thrown about. In residential places like Helensburgh, it was of the greatest consideration that works such as gas-works should be carried on so that nobody might know that they were there. He thought they were going to have this state of things at Helensburgh. Most of them were looking forward to the time when only vertical retorts would be in use. In his opinion, the days of the horizontal retort, even with machinery, were numbered. The Helensburgh Corporation were to be congratulated on leading the way in Scotland in adopting the vertical system. They were also to be congratulated on having so practical a Manager as Mr. Blair. It was not everyone who would have had the courage to adopt, in a town the size of Helensburgh, a process such as the one they had inspected, without having seen it adopted in a good many other places. Most of them who had seen the plant that day knew that Mr. Blair did not advise his Corporation on anything he did not know all about. This being the case, they were bound to have good results.

Mr. T. WILSON (Coatbridge), in support of the resolution, complimented the Corporation and their Manager on their courage—or, he might say, daring—in introducing a system of vertical retorts. He knew a number of gas-works in Scotland, with much more money at their command, who had been waiting the results of the experiments at Helensburgh. He had never seen a more workable installation of retorts than they had just inspected; and he had learned something. His Directors were about to expend a considerable amount in improving the gas supply of their district; and he thought that what they had heard would help them very considerably. He had no doubt that the installation they had seen would, in the hands of their friend Mr. Blair, be a certain success.

Provost MACLACHLAN, in acknowledging the resolution, said that since the gas-works were taken over by the Corporation they had been a success; and the Corporation had been able to reduce the price of gas 1s. 8d. per 1000 cubic feet. They had added plant, all of the newest description, two holders—one spiral, the other telescopic; and he was pleased to say that they stood at present with a capital outlay of £51,930. The total liabilities were £42,048; and they had surplus assets of £13,531. The visitors would see that the Corporation stood in a very good financial position as regarded their gas undertaking. He would like to add his quota of praise to the work which had been done. The guarantee of Messrs. West was a carbonization of 2 tons 15 cwt. of coal per retort per 24 hours; and they had already put through 3·06 tons. With a test of 19 tons 18 cwt. of coal, 253,400 cubic feet of gas were made, which was equal to 12,605 cubic feet of gas per ton. The gas made per retort in 24 hours was 38,610 cubic feet; and the illuminating power was 16·3 candles, tested with a "Metropolitan" No. 2 burner. The yield of tar and liquor was 52 gallons per ton (10-oz. liquor), compared with 48 gallons previously. The coal carbonized in the vertical retorts had amounted to 500 tons. The make of gas had been 6,172,500 cubic feet, which was equal to 12,345 cubic feet per ton. This was 23 per cent. more than they had from the old retorts.

Mr. BLAIR added that tests made from Aug. 29 to 31 showed better results than those which had been given by Provost Maclachlan.

The company were subsequently entertained at dinner in the Imperial Hotel—Mr. F. J. West in the chair. Among the toasts given were "The Corporation of Helensburgh," proposed by Provost Armour, of Johnstone, and responded to by Provost Maclachlan; "The Gas Committee of the Helensburgh Corporation," proposed by Mr. Alex. Wilson, and responded to by Councillor G. Sellars; "The Visitors," proposed by Councillor Bonnar, and responded to by Mr. Alex. Wilson, of Glasgow, and Bailie M'Namee, of Wishaw; "The Gas Engineer," proposed by Mr. W. B. M'Lusky, of Perth, and responded to by Mr. Blair; and "The Contractors," proposed by Provost Maclachlan, and responded to by the Chairman.

Factory Illumination in Holland.—The law for factory illumination in Holland stipulates that the employment of women and young children is forbidden in works in which the artificial light is normally required between 9 a.m. and 3 p.m. An illumination of 1½ foot-candles is specified as the minimum for certain processes exceptionally trying to the eyes—such as type setting, engraving, drafting, instrument making, &c.; and a minimum of 1 foot-candle in less exacting occupations.

Telephones in Gas-Works.—The Committee of the German Association of Gas and Water Engineers have sent an inquiry sheet to the members, and to the postal authorities, in order to ascertain whether any accidents had been caused by the installation of telephones and electric bells in their apparatus-rooms. No case of gas being lighted by sparks from these instruments was reported. In special experiments, ignition sometimes (but only rarely) resulted when gas was blown on instruments in action. The Association have resolved to permit the installation of telephones in the apparatus-rooms of gas-works. They should, however, be fixed outside, and the bells, if inside, be provided with guards of gauze.

THE LATE MR. RAPHAEL HERRING.

The funeral of Mr. Raphael Herring, of Dover, whose death on the 27th ult. was briefly announced in the "Journal" last week, took place at Buckland Church on Thursday, when the Directors of the Dover Gas Company, the staff, and all the men who could be spared from work, were present. In addition to the large number of beautiful floral tributes from members of the family and personal friends, wreaths were sent by the Chairman, Directors, and Secretary of the Company, the employees at the Buckland works, the head office staff and the distribution department, and the members of the benevolent and other societies connected with the works.

The few particulars that were given last week in regard to the late Mr. Herring may be supplemented by the following brief sketch of his lifework: At the outset of his career he was in the service of the Equitable Gas Company, at their works at Pimlico, and later on in that of the Commercial Gas Company. He left this position in order to give more attention to several of his inventions connected with appliances used in gas manufacture. In 1877, however, he once more entered the ranks of gas managers, under Mr. Hack, at the Saltley station of the Birmingham Corporation. Ten years later, however, he was appointed Resident Manager of the Dover Gas Company, in succession to Mr. Ravenhill, who retired on account of ill-health. On leaving Birmingham, he was presented with a testimonial. As mentioned last week, Mr. Herring was a member of the Southern District Association of Gas Managers; and in addition to the paper then referred to, he read one, at the autumn meeting in 1905, on "A High-Speed Exhauster for Pressure-Raising in Gas-Mains." Mr. Herring, who was 74 years of age, leaves a widow and family of four sons and two daughters. One son, Mr. W. R. Herring, as readers are aware, is now in practice in Westminster as a Consulting Engineer, and another, Mr. E. C. Herring, is Assistant Engineer and Manager at Dover.

In the course of the obituary notice of Mr. Herring which appeared in the "Dover Express" last Friday, the following reference was made to his work at Dover: "He was very successful, owing to Mr. Willsher Mannering, the Chairman of the Company, and his co-Directors working hand-in-hand with their Engineer and Manager. At the same time, Mr. Herring cultivated a good feeling of loyalty and comradship among the under officials and workmen; there being a centre of union on the works in the form of a reading and recreation room, which he was the means of establishing soon after he took charge of the works."

OBITUARY.

The current number of the "Co-Partners' Magazine" of the Gaslight and Coke Company records the death, on the 9th ult., after a short illness, of Mr. W. Stephenson, the station head clerk at Stratford. He entered the service of the late Imperial Gas Company in September, 1871, and when the Company was absorbed by the Gaslight and Coke Company in 1876, he became station head clerk at Shoreditch, and afterwards assistant chief of the store department at Westminster. He resigned his appointment in July, 1903, owing to ill-health; but later on he enjoyed the almost unique experience of returning to the Company's service after having been pensioned. Some time after retiring, he found his health sufficiently restored to enable him to accept an appointment with the West Ham Gas Company; and when the amalgamation of that Company with the Gaslight and Coke Company took place in January last year, Mr. Stephenson's knowledge of station work eminently fitted him for the appointment he then received, of station head clerk at Stratford. Thus he returned to the old service, and died in harness at the age of 68.

Exports of Mineral Oils from the United States Last Year.—According to the Bulletin of the United States Geological Survey, the exports of mineral oil last year were as follows: Crude, 119,630,159 gallons; illuminating, 932,343,617 gallons; naphtha, 79,059,528 gallons; lubricating and paraffin, 158,866,676 gallons; residuum, 107,095,460 gallons—total, 1,396,995,440 gallons, compared with 1,496,795,106 gallons in 1909.

Eastern Counties Gas Managers' Association.—We learn from the Hon Secretary and Treasurer (Mr. T. A. Guyatt, of Ely) that the next meeting of the Association will be held at Felixstowe on Friday, the 29th inst., and that the programme will include the Inaugural Address of Mr. F. Paternoster, the Manager and Secretary of the Felixstowe Gas Company, and a paper by Mr. W. B. Farquhar, of Ilford, on "High-Pressure Lighting."

New Edition of "Michael and Will."—We have received from Messrs. Butterworth and Co., of Bell Yard, E.C., the sixth edition of "Michael and Will on the Law Relating to Gas and Water." The preceding edition was produced under the editorship of the late Judge Shiress Will; but his judicial duties and lamented death necessitated the selection of a successor. The services of Mr. Joshua Scholefield, of the Middle Temple and the North-Eastern Circuit, and Editor of "Lumley's Public Health," were secured; and under his supervision the present edition of the book, a fuller notice of which will appear in a subsequent issue, was prepared.

PERSONAL.

On the 1st of May last, the Chairman of the Romford Gas Company—Mr. Joseph Smith, J.P.—reached his Jubilee as a Director; and his colleagues on the Board felt that the shareholders would naturally wish to mark this interesting event by offering Mr. Smith some proof of the regard and esteem which they feel for him, and in grateful remembrance of his long and able services. On behalf of the Company, he was presented with a set of decorative silver for the table, of the value of 50 guineas; and in the report presented at the recent half-yearly meeting, the Directors expressed the assurance that this presentation would have the cordial approval of the shareholders.

As noted in another column, it was resolved at the recent annual meeting of the Barnsley Gas Company to place on record the shareholders' appreciation of the fifty years' services of Mr. W. W. Hutchinson with the Company, and regretting that ill-health had caused him to resign the position of Secretary and General Manager. The Chairman (Mr. E. G. Lancaster, J.P.), at the opening of his address to the proprietors, said that Mr. Hutchinson had spent practically all his life with the Company. He was born on the place; and the whole of his working life had been devoted to the interests of the undertaking. The positions he had held were now divided; Mr. Harold Hutchinson having been appointed Manager of the productive part, and Mr. T. W. Roystone Secretary. They would work in conjunction; and the Directors hoped that the results might be still more satisfactory than in the past.

Electrolysis of Water-Mains in Chicago.

Electrolysis of water-mains has been investigated in Chicago by the Bureau of Public Efficiency, in order to ascertain if it is a factor in the great leakage from pipes which is believed to be taking place. This loss of water has been estimated to amount to two-thirds or three-quarters of the whole quantity pumped. Last year, Mr. Dabney H. Maury reported that about 170 million gallons a day were probably wasted through leaks in street-mains and service-pipes. As a result of an electrolysis survey by the Bureau's Chief Engineer, Mr. A. J. Hammond, it is stated in the report on the investigation that numerous pipes were found to be leaking owing to damage by electrolysis, and that the mains were in many cases found to be carrying sufficiently heavy currents to render this source of injury to the distribution system something to be studied carefully and at regular intervals. It is considered particularly important to take up the subject just now, because the city is contemplating installing a high-pressure fire-protection system, and any failure of pipes under 300-lb. pressure would probably be very destructive. The pipes will probably be made of steel, which, according to the Bureau, is more easily affected by electrolysis than cast iron; and no precaution should be spared to protect them from such injury. It is stated in the report that no remedy can be prescribed definitely until the trouble has been investigated thoroughly; and therefore a comprehensive electrolysis survey is urged to determine the existing conditions.

Proposed Formation of an Institution of Water Engineers.—Application has been made to the Board of Trade, under the Companies (Consolidation) Act, 1908, for a licence directing an association about to be formed under the name of the Institution of Water Engineers to be registered with limited liability, without the addition of the word "limited" to the name. The objects for which the proposed Institution is to be established are: (1) To acquire and take over the whole or any of the assets and liabilities of the Association of Water Engineers, established in 1896; and (2) to promote the advancement of water engineering in all or any of its branches, and all matters connected with or relating to water undertakings.

Friction Losses in Elbows and Tees in Small Pipes.—This is a subject which has not often been investigated, though the importance of friction losses in certain classes of construction has been frequently emphasized. Experiments made some nine or ten years ago by Mr. C. W. L. Alexander, at the University of Birmingham, showed that Weisbach's formula for these losses gave results which were too large for sharp bends and too small for long ones. But his work was limited in scope, and made with pipes of varnished wood. We learn from "Engineering Record" that further investigations into this subject have been carried out at the hydraulic laboratory of the University of Wisconsin, under the direction of Professor George J. Davis, who has published the results in one of the University "Bulletins." The experiments were conducted with 2-inch pipe, a number of standard commercial fittings, and several bends of different radii made from pieces of 2-inch pipe. These were inserted between runs of pipe of sufficient length to permit the determination of the entire distance, above as well as below the bend, in which the latter affected the regularity of the flow. The losses at many different velocities were determined for each bend or fitting; and the results are tabulated, and also plotted logarithmically. With 10 feet velocity, the loss of head due to curvature first becomes apparent when the radius of the bend is about 32 times the diameter of the pipe, and increases very slowly until the radius is about six diameters. Then it grows in a rapidly increasing amount until at a radius of two diameters it is three times what it was at six diameters, and at one diameter is about nine times what it was at six diameters.

WAGES AND HOURS OF LABOUR IN 1910.

Labour statistics of one kind and another are certainly just now much in evidence; but this fact would not justify the overlooking of the yearly volume of the Labour Department of the Board of Trade, dealing with changes in wages and hours of labour. It is a useful guide to trade conditions, and so some of the principal points from the latest issue (which was published a few days ago) may be noted.

It is the eighteenth annual report, and bears the signature of Mr. G. R. Askwith; and it deals with the changes, during the year 1910, in the rates of wages and recognized hours of labour of workpeople in the United Kingdom for a full week's work, exclusive of overtime. Before noticing the figures, it should be mentioned that, for the purposes of the report, a "change in wages" is defined as a change in the rate of remuneration of a certain class of workpeople, apart from any change in the nature of the work performed. Changes affecting less than five workpeople in each case are not included; and the report does not deal with changes in average earnings arising out of variations in the extent of employment obtainable by workpeople. It is pointed out that the Department received returns from employers and Employers' Associations, Trade Unions, its own correspondents, and other sources; and the daily and trade papers were searched for references to any movements in wages or hours. As soon as there was any reasonable ground for believing that some change had taken place, forms of inquiry were issued to the parties concerned, inviting them to state the facts; and as a general rule they readily complied. The statistics may therefore, it is added, be said to rest on the basis of the replies received at first-hand from those best able to furnish exact particulars at a time when the facts were fresh in their memories. It is not suggested that the records used in the report are complete; but owing to the general prevalence of collective bargaining between organizations of employers and of workpeople, it has been found possible to obtain particulars of changes covering, in most industries, a large proportion of the industrial population, and consequently affording an indication of the direction of the movement in the market rate for labour. The year 1910 was one of improving trade and employment; and Mr. Askwith remarks that this fact is reflected in the changes in rates of wages, which showed a net increase of £14,500 per week, as compared with net decreases of £69,900 and £59,200 in 1909 and 1908. The net amount of the changes in 1910 was largely affected by the fact that the prices of coal and iron did not show such a marked upward tendency as other commodities, with the result that the net increase in weekly wages in these industries was only £7352. Since 1896 there have been three periods of rising wages (1896-1900, 1906-7, and 1910) and two periods of falling wages (1901-5 and 1908-9); the net effect being an increase of £353,985 in an ordinary week's pay of the workpeople directly affected. The downward movement in wages which commenced in 1908, and continued during the greater part of 1909, was checked towards the end of the latter year. Early in 1910 it gave place to a slight upward tendency which was, on the whole, maintained during the remainder of the year, with the result that the general level of wages at the end of the year was, with two exceptions (1907 and 1908), higher than at the end of any year since 1893, when statistics of changes in rates of wages were first systematically collected by the Department. The net effect of the changes in hours of labour reported last year was a reduction of 47,575 in the weekly working time of the persons affected.

As already remarked, the net result of all the changes reported to the Department as taking effect in 1910 was an increase of £14,500 per week in the wages of 548,900 workpeople. Agricultural labourers, seamen, and railway servants are not included, as the numbers affected are not known. Of the total named, 391,200 received a net increase of £16,400 per week, and 137,400 sustained a net decrease of £1900 per week; while the remaining 20,300 workpeople had upward and downward changes which left their wages at the same level at the end as at the beginning of the year. In 1909, 1,154,800 workpeople sustained a net decrease of £68,900 per week. If, says the report, the effect of the changes in rates of wages be calculated from the date of each change to the end of the year, the aggregate increase in wages due to these changes is computed at £138,000 in 1910, as compared with decreases of £2,757,400 and £873,800 in 1909 and 1908 respectively, and increases of £5,821,000 and £1,419,000 in 1907 and 1906. As in previous years, the changes in the coal-mining industry accounted for a large proportion of the number of workpeople affected, and also of the total amount of the changes, though the proportion of the latter accounted for by coal mining in 1910 was considerably smaller than in most of the previous years. Of the total number of workpeople whose wages were changed, 70 per cent. were employed in this industry; the amount of their net increase forming 38 per cent. of the total. The engineering and shipbuilding trades accounted for 9 per cent. of the number affected and 18 per cent. of the amount of change. The corresponding percentages for the manufacture of pig iron and iron and steel were 8 and 13, and for the textile trades 5 and 13. The changes in the fifteen years, 1896 to 1910, show a net increase in every group of trades dealt with. The total net increase, as already stated, is £354,000 per week; and of this, coal mining accounts for £168,000, or nearly one-half, while the building, engineering and shipbuilding, and textile trades account for £117,300, or nearly one-third of the total.

The proportion of the total industrial population (5·6 per cent.) affected by ascertained changes in rates of wages in 1910 was lower than in any of the previous ten years; and the proportion of the workpeople so affected was as usual largest (38·4 per cent.) in coal mining. The actual number of persons connected with this industry who were affected by changes in wages last year was, however, smaller than for several years past. This is due to the fact that no changes were recorded in the Federated Districts (comprising Yorkshire, Lancashire, Cheshire, Nottinghamshire, Derbyshire, Leicestershire, Warwickshire, Shropshire, parts of Staffordshire, and North Wales), Scotland, or the Forest of Dean. In Durham wages fell; while there was an increase in Northumberland and South Wales. The number of workpeople affected in 1910 was 383,586; and the net effect of the changes was an increase of £5488 per week. In all cases wages stood at a higher level at the end of 1910 than at the end of 1896. In every instance, however, with the exception of the Federated Districts, South Staffordshire and East Worcestershire, and Bristol, they were below the high level attained in 1900. In the districts named, wages stood at the same level as at the end of 1900. In 1910, 10,512 workpeople engaged in the mining of ironstone and iron ore had their wages changed; the net result being an increase of £414 per week. In the previous year, the 9521 workpeople sustained a net decrease of £236 per week. In the quarrying industry, 5806 workpeople received a net increase of £289 per week; while the figures for 1909 showed a net increase of £147 per week in the wages of 3123 persons.

In the metal, engineering, and shipbuilding trades, the number of workpeople affected by changes in wages in 1910 was 97,343; and the net result was an increase of £4732 per week. In the previous year, 93,484 persons sustained a net decrease of £4325 per week. The most important changes in the engineering trades were increases affecting 20,000 people on the North-East Coast and 13,000 on the Clyde. The amount of the change was 2½ per cent. on piece rates and 1s. per week on time rates in the former case, and 5 per cent. on piece rates and ¼d. per hour or 1s. per week on time rates in the latter. In addition, 1279 engineers and boilermakers at Birkenhead, 1500 engineers at Bradford, and 1200 ironmoulders at Sheffield received an increase of 1s. per week; and 3000 boilermakers on the Clyde received 5 per cent. on piece rates and ¼d. per hour or 1s. per week on time rates. Employment in the engineering and shipbuilding trades in the first part of 1910 showed a marked improvement as compared with 1908 and 1909; but it was adversely affected in the latter months of the year by the boilermakers' dispute. The mean percentage of trade unionists unemployed in the engineering industry in 1910 was 5·8; and in the shipbuilding industry, 13·2. The corresponding figures for 1909 were 11·6 and 22·1 respectively. The changes in rates of wages in the textile trades in 1910 affected 29,220 workers, and resulted in a net increase of £1848 per week. Increases amounting to £1864 per week affected 28,662 persons; while 558 sustained decreases amounting to £16 per week.

The tables set forth that 43 gas workers in company employ received a total weekly rise in wages amounting to £3. With regard to local authorities, there are recorded various instances of advances. At Shipley, gas-works labourers received rises of 8d. to 2s. 9d. per week, making the wages 22s. 8d. to 24s. 9d.; coke-wheelers, 2s. or 3s., making the wages 24s. and 27s. per week; stokers, 4d. to 6d. per shift, making the pay 5s. 4d. and 5s. 6d.; and meter inspectors, 2s. per week, making the wages 28s. and 30s. In connection with the Leeds Corporation gas undertaking, the following advances were made: Stokers, firemen, drawers, and attendants, 2d. per shift, to 5s. 6d.; chargers, 2d. per shift, to 5s. 8d.; machine-men, 1d. per shift, to 5s. 9d.; coal-wheelers and purifiers, 2d. per shift, to 4s. 6d.; coke-wheelers, 3d. per shift, to 4s. 7d.; coke-trimmers, 2d. per shift, to 4s. 4d.; yard labourers, 2d. per shift, to 4s. 2d.; horsemen and cartmen, 1s. per week, to 27s. The lamplighters at Devonport have enjoyed rises of 1s. or 1s. 6d. per week, making the wages 22s. and 22s. 6d.; at Eastleigh, of 1s. or 2s. per week, to 20s. to 23s.; and at Johnstone, of 1s. per week, to 24s.

As to the methods by which changes in wages were arranged last year, 7·3 per cent. were under sliding-scales, against 3·3 per cent. in 1909; 69·5 per cent. were by conciliation boards, mediation, arbitration, &c., against 68·2 per cent.; and 23·2 per cent. by other methods (direct arrangement, negotiation, &c.), compared with 28·5 per cent. It is pointed out that the diminution shown in the last eight years in the number of persons whose wages were regulated by sliding-scales (from 19·2 to 7·3 per cent.) is almost entirely accounted for by the alteration in the method of arranging the changes in rates of wages of the South Wales coal-miners. Up to the end of 1902, their wages were regulated by a sliding-scale; but since then they have been arranged by a conciliation board. The number of workpeople in 1910 whose changes in wages were preceded by a stoppage of work was small (10,275, or 1·9 per cent.); but in this calculation no account is taken of strikes or lock-outs that failed to produce a change in wages, or of threatened strikes or lock-outs that may have influenced the changes.

Turning now to the section of the report which deals with changes in hours of labour, it is found that the number of workpeople affected in this way in 1910 was small compared with that of those whose wages were changed. But, of course, the changes recorded do not include temporary alterations in the working

hours owing to variations in the state of trade, or the regularly recurring seasonal alterations, as in the building trades. The changes reported affected 27,366 workpeople, of whom 8006 had their aggregate working time increased by 7086 hours per week, and 19,360 had reductions amounting to 54,661 hours per week. The net effect of all the changes was thus a reduction of 47,575 hours in the weekly working time of the persons affected. Of the total number affected by changes in hours of labour, 12,918 were in the building trades. A table covering the last ten years shows that in each year there has been a net reduction in working hours per week of people affected by such changes.

A TREATISE ON SHALE OIL.*

Dr. W. Scheithauer is manager of one of the largest works in the Saxony-Thuringian district in which brown coal or lignite is distilled for the production of oil. The manufacture of this brown coal crude oil, or tar, is carried out much in the same way as the production of crude shale oil in Scotland; and the work by Dr. Scheithauer, which is before us, deals with the manufacture of oil by the distillation of shale, brown coal, and certain descriptions of bituminous coal.

The author is already well known as the writer of a text-book on the manufacture of mineral oils, which was noticed in the "Journal" some years ago (Vol. LXVI., p. 871). The present work is of a rather more specialized character, and closely follows in style and execution the already published examples of the new series of handbooks on chemical technology issued by the publishing house of Otto Spamer, of Leipzig, under the general editorship of Dr. Ferd. Fischer. The present volume is well worthy to take its place in this excellent series.

At the outset, the author traces the history of dry distillation processes, beginning with the distillation of wood by Boyle in 1661. In 1681, a patent was granted for the production of pitch and tar from ordinary bituminous coal; but it was not until the beginning of the Nineteenth Century that the distillation of shale or lignite was conducted on a large scale. Its development was due in Scotland to the labours of James Young, and in Germany to those of Carl von Reichenbach. As is well known, the Scotch industry has had a hard struggle to survive in the face of the competition of imported mineral oils. The German industry has benefited by the protection afforded by a high import duty on mineral oils; but owing to the limited supply of high-grade raw material and other causes, it has proved quite unequal to meeting the native demand for burning oil, and the importation of the latter into Germany is extremely large. A more recent, and in many respects more important, development of the shale-oil industry is that which has taken place in Australia, where the rich native bituminous shale is distilled in large quantities for the production of oil, and may eventually keep imported oils out of the Australian market. This Australian shale was at one time imported on a small scale into Great Britain as a substitute for cannel, and considerable quantities of it were until quite recently used by the Frankfort-on-Maine Gas Company for the manufacture of the gas which it supplied, and which was required to be of an illuminating power of about 35 candles. The reorganization of the Frankfort gas supply about two years ago incidentally involved the abolition of this high-grade gas, and no doubt since that time Australian shale has been less in demand than hitherto for gas making in Frankfort.

Dr. Scheithauer reviews the bituminous raw materials available for the production of crude oil. These are the bituminous lignites or brown coals of Saxony and the bituminous coals of Messel, the Scotch bituminous shales, the bituminous shales of Autun and Buxières les Mines in France, and the bituminous shales of New South Wales already referred to. There are reported also to be deposits of bituminous shale in French West Africa, and in New Brunswick. The origin of these deposits is discussed, and the properties and composition of the brown coals and shales are dealt with fairly fully. The author proceeds in the third chapter of the book to deal with the distillation process for the production of the crude oil or tar. The methods followed when brown coal or lignite is the raw material are first dealt with, then the different methods followed with bituminous coal at Messel near Darmstadt, and finally the Scotch shale processes. The French and Australian shale oil industries follow the Scotch procedure.

The author next reviews the methods of investigating the crude oil or tar and the liquor obtained in the first distillation of the lignite or shale, and the evaluation of the residues. He then goes on to describe the distillation of the crude oil or tar for the separation therefrom of commercial products. Tables are given showing the average proportions of different grades of oil obtained from brown coal tar and Scotch crude oil. In the sixth chapter, the chemical treatment of the distillates is dealt with.

The important branch of paraffin manufacture is the subject of the seventh chapter. This refers more particularly to the crystallization, pressing, and purification of solid paraffin from the brown coal oils; but there are a few pages also with reference to the recovery of paraffin from Scotch shale oil. The eighth chapter discusses the yields and results of the industry, especially the Saxony-Thuringian branch of it. In the ninth chapter, candle manufacture is dealt with; and the tenth chapter refers to the chemical composition of the crude oil and its distillates. The laboratory work involved in the industry is the subject of the eleventh chapter, and is adequately treated. The twelfth chapter gives statistics of different branches of the industry.

In Saxony-Thuringia, 62,363 metric tons of crude oil or tar were produced during 1909 in eleven factories. The crude oil produced in Scotland is over four times this quantity. There are now only six companies at work in Scotland; but they have about 1500 retorts in action. In regard to the development of the industry, the author points out that the distillation apparatus has played a far more important part in Scotland than in Saxony-Thuringia. Since the seventies, there have been no considerable changes in the distillation retorts of Saxony-Thuringia; while new types of retort have been continually introduced into Scotland up to the most recent years. The reason for this difference, he says, is that in the working-up of brown coal or lignite the production of coke takes an important place, and this is effected quite satisfactorily by the old apparatus. On the other hand, the recovery of ammonia takes the place of coke production in the Scottish shale oil industry, and there have been constant and successful efforts in Scotland to improve the yield of ammonia by changes in the retorts and methods of distillation.

In conclusion, we may say that Dr. Scheithauer has prepared in this volume an excellent account of the shale and brown coal oil industries. The account is necessarily more exhaustive and authoritative in respect of the brown coal branch of the industry; but within the limits of his space, he has dealt very satisfactorily also with the Scotch shale branch of the industry.

* "Die Schwelteere, ihre Gewinnung und Verarbeitung," von Dr. W. Scheithauer, Direktor. Leipzig: Otto Spamer; 1911.

CONSTRUCTION AND MANAGEMENT OF SMALL GAS-WORKS.*

It must be conceded that Mr. Norton H. Humphrys, in his book on "The Construction and Management of Small Gas-Works," has satisfied a want. It is a very common complaint, by men in charge of small works, that little is written to help them in their special difficulties. It is but natural that the managers of these works who are both competent in their duties and in the production of journalistic matter are few and far between; hence the comparative lack of technical fare for the small works' man. It must, therefore, obviously be left to men of the calibre of Mr. Humphrys to supply the deficiency.

The book under review is good in every respect, and deals very ably with the whole question of the management of small works; carefully explaining such matters as the "Legal Position of Small Gas Companies," "Raising and Spending Capital," "Selling Prices and Terms of Supply," and "Accounts—Forms and Tables," in addition to the details of the manufacture and distribution of gas. A Supplement on the "Actual Costs and Capacity of Recently Erected Gas-Works," by Mr. Brearley, who gives valuable information on this subject in his description of the construction of three gas-works, greatly adds to the usefulness of the book.

Mr. Humphrys explains in his "Introductory" chapter that his remarks are chiefly addressed to those who are in charge of small works making less than 10 million cubic feet of gas per annum. He states that there are no less than 450 undertakings in the United Kingdom making 5 millions or less in the period named. To deal briefly with the subject-matter of the respective chapters, Chapter IV. relates to "Laying-Out Design of Gas-Works," and contains some useful advice. Then follows a comparatively short chapter on "Distribution." In another short chapter (VI.) on "Commencing Operations" is discussed the type of man best suited for the position of working manager. The writer is at his best in Chapter VII., on "The Manager on the Works." Lax methods—so often observed in the past—are condemned; and much sound common-sense advice is given on the important details of small works management. Then follows "The Manager in the District;" and it is shown that it is as necessary to keep one's temper with exacting consumers as it is to properly regulate district pressures. In a chapter on "Selling Prices and Terms of Business," Mr. Humphrys shows how erroneous is the "very general idea that the working expenditure *plus* the sum required for dividend will represent a fair selling price." Much-needed advice is also given on the question of "slot" meter prices and unprofitable consumers. In dealing with "Public Lighting," it is shown how prevalent is the practice in villages of short and intermittent lighting hours, and how necessary it is to take this custom into account in framing the price of gas for this purpose. In Chapter XI., on "Unaccounted-for Gas," we meet with the statement that "there is too great a tendency to suppose that a loss of 15 to 20 per cent. must be accepted as unavoidable;" preparing the reader for much wise counsel on the necessity of carefully watching the sources of leakage and loss both in works and district. It will be news to some that the installation of a sulphate plant in a 3 million gas-works may prove a good investment. Mr. Humphrys deals with the subject, and briefly describes Wilton's plant for the direct production of sulphate in small works.

Not the least useful part of the book is the reproduction of

* "The Construction and Management of Small Gas-Works." By Norton H. Humphrys, Assoc.M.Inst.C.E., F.C.S. With a Section on "Actual Costs and Capacity of Recently Erected Works," by John H. Brearley. London: John Allan and Co.; 1911. [7s. 6d.]

seventeen specimen forms suitable for keeping accounts and records relating to works and district.

Mr. Brearley has but a small portion of the book in which to give details of the construction of three small works; and there is little doubt that this useful and practical information will be referred to by those engaged in the erection of gas-works. Drawings and plans are given, and also details as to the cost of each part of the plant, and other expenditure.

Both portions of the book will doubtless prove valuable to those engaged in the management of small undertakings.

MANUFACTURE OF SULPHATE OF AMMONIA.

It is a curious fact that, while there are few gas-works of any size without a sulphate plant, there has been until recently no book on the subject to which either the student or the practical man could refer for information. Mr. Gascoigne T. Calvert, the late Manager of the Nechells Chemical Works, Birmingham, has supplied the demand with a publication which is likely to prove popular and may be of some assistance to those without much practical experience on the subject.* In this book of 153 pages there is contained much information profusely illustrated.

The author deals first of all with the composition and analysis of sulphate of ammonia, and passes on to the raw materials—ammoniacal liquor, sulphuric acid, and lime. Chapter III. treats of the plant in general and superheaters in particular; and attention is drawn to the tachometer—an interesting little instrument by means of which it is possible to record on a chart the revolutions of pumps. There is no need to question the utility of such a tell-tale in a sulphate plant working at night. The various types of stills are described in chapters IV. and V., followed by details of liming apparatus, waste liquor valves, and well-known types of saturators and the different methods by means of which they are discharged. It is particularly noteworthy, from a perusal of this work, that modern apparatus has played its part in greatly reducing the amount of labour required in making sulphate. Nowadays, with up-to-date plant of large size there is, practically speaking, little need for manual labour; all the work being carried out by mechanical appliances merely requiring skilled attention. The author deals in an interesting manner with methods of drying, storing, and packing sulphate.

In Chapter IX., the author explains the means of disposing of the waste gases from the saturator. In this connection, conversion into sulphuric acid, the Claus process, and oxide purification are all discussed; and the advantages and disadvantages of each method are explained. A chapter on "Starting, Working, and Stopping the Plant—Difficulties in Working and their Remedies," will be helpful to readers. It is this practical information which is valuable, but which the practical writer is often chary of imparting to his readers from reasons of false modesty, under the impression that "everyone knows that."

The work may be confidently recommended to all those who have any part in the management or working of sulphate plants. The information contained in it proceeds from a source which is decidedly reliable, trustworthy, and experienced; and the clear style in which the book is written renders the subject matter easy of grasp by the reader.

* "The Manufacture of Sulphate of Ammonia." By Gascoigne T. Calvert. London: John Allan and Co.; 1911. [7s. 6d.]

Alderman Thomas Briggs, of The Cedars, Bowdon, Cheshire, Lord Mayor of Manchester from 1899-1900, the Chairman of the Brynn Hall Colliery Company, Limited, and a Director of the Manchester Ship Canal Company, whose death on May 28 last, aged 80, was announced in the "Journal" for the 6th of June, left estate valued at £69,911 gross, with net personalty amounting to £54,198.

The "Co-Partners' Magazine" of the Gaslight and Coke Company says that Mr. J. Hunter, Inspector-in-Charge at the Camden Road office of the Company, will retire on the 1st of November next on account of ill-health, and that Mr. R. Willsmer, Inspector-in-Charge at Mare Street, will succeed him. Mr. Hunter entered the service of the Imperial Gas Company in May, 1870, and completed 41 years' service on the 17th of July last.

Mr. M. M'Callum Fairgrieve, of the Edinburgh Academy, has written to "Nature" to direct attention to the inaccuracy of a common statement in elementary text-books describing the action on litmus of carbon dioxide in solution. The writer says it is generally stated that the action of carbon dioxide is to turn litmus "wine red;" while the fact is that carbon dioxide dissolved in distilled water turns neutral litmus red, just like any other acid. The cause of the wine-red colour usually obtained is the presence of alkaline bicarbonates as impurities. That this is the case can be seen by adding a drop of ammonia or sodium carbonate solution to the carbon dioxide solution, when the colour changes, first, from red to blue, and then, after an interval which depends on the amount of alkali added, to the wine red usually associated with the action. A weak solution of lime water acts similarly; and this would seem to be the origin of the error, as if hard waters are used to make up the solutions the wine-red colour is produced.

MANUFACTURE OF SULPHATE OF AMMONIA BY THE DIRECT PROCESS.

A Study of the Modern Methods.

By G. Stanley Cooper, B.Sc., F.C.S.

To the German chemist, Brunck, is due the credit for having originated a process which has completely revolutionized the methods of manufacture of sulphate of ammonia, and, indeed, one might say, the whole coke-oven industry. Probably in a few years' time, the improved process will have spread to gas-works, where at present the old method of distillation of liquor holds almost universally.

Brunck's installation cannot be said to have been a success practically; but he sowed the seed of revolution, and later workers have benefited by it. Perhaps the two chief processes in operation at the present time on the direct method are those of Koppers and the Otto-Hilgenstock Company respectively. In another direction, and based on entirely different principles, are the processes of Feld, Burkheiser, and Burstall. In this article, only the two direct processes of Koppers and Otto-Hilgenstock and Burkheiser are dealt with—the others being at present in a more or less experimental stage, and much information concerning them not being available.

Undoubtedly, the ideal process is that put forward by Burkheiser, and carried out by him at Berlin, Hamburg, &c. Here we have crude coal gas containing all the materials necessary for the manufacture of sulphate of ammonia. Why then should it be necessary to have recourse to the aid of outside agencies? The sulphur in coal gas is capable of being transformed into a compound which will combine with ammonia directly to form sulphate of ammonia. In ordinary processes, this sulphur is removed by oxide and converted into sulphuric acid; and then this acid is used to neutralize the ammonia. Theoretically, therefore, the process is an ideal one, and must commend itself to all scientists as being the final aim of sulphate makers. Unfortunately, the process does not seem to be quite as easy to work on a practical scale as it is to map-out on paper; and numerous difficulties are met with, which lie outside the theoretical process. However, the Burkheiser Company are confident of the ultimate success and value of the process; and a few years may see great developments in this direction.

By a truly direct process, one would understand a process in which all the ammonia is absorbed from the gas by the sulphuric acid, and converted into sulphate of ammonia. There would be no distillation of liquor at all—indeed, there would be no liquor, Accepting this definition, the Koppers' process would be classified as a semi-direct process; for condensation does take place, and about half the usual amount of liquor is produced. This liquor contains practically the whole of the "fixed" ammonia salts which are present in the crude gas. The liquor is distilled, and the ammonia evolved is mixed with the stream of crude gas and passes into the saturator with it. In this way, the whole of the ammonia in the gas—both "free" and "fixed"—is recovered in the saturator, with a minimum amount of distillation.

The reaction between sulphuric acid and ammonia is exothermic; but Koppers found that the heat produced was not sufficient to maintain the liquor in the saturator at a temperature requisite for the production of solid sulphate, so long as the crude gas was passed into the saturator cool. He, therefore, devised the process of heating-up the gas after leaving the condensors, and passing it into the saturator at a higher temperature. Such conditions he found quite satisfactory for the production of a good salt; and it is upon this principle that the Koppers' process works.

The Otto-Hilgenstock process claims to be a truly direct process, in that no distillation is evolved—there being no condensation and no effluent liquor. On leaving the ovens, the gas is sprayed with hot tar; and this is said to remove practically all traces of tar-fog from it. From this tar spray, the gases go direct to the saturator; and here the ammonia is extracted.

One or two questions suggest themselves in connection with this process. It is stated that the gases are maintained throughout at a temperature above the dew-point, and hence there is no condensation of aqueous vapour and no solution of ammonia. This being so, it necessarily follows that the fixed ammonia salts are carried forward into the saturator. Of the fixed ammonia salts, 70 to 80 per cent. consist of ammonium chloride; and if this reacts with the sulphuric acid in the saturator, some hydrochloric acid gas would be produced and carried forward. This gas wou d be a source of great trouble in the mains, owing to its high corrosive power. If no hydrochloric acid is produced, then the ammonium chloride would eventually be precipitated along with the sulphate; and hence the latter would be partially contaminated.

To the writer, this seems to be the possibility if there is no condensation. On the other hand, if there is condensation, then if the ammonia is to be recovered at all, recourse must be had to distillation or evaporation. It has been suggested that the liquor should be evaporated, and solid ammonium chloride recovered in this way; and hence all the ammonia would be accounted for.

The above outline shows briefly the trend of the development in sulphate manufacture and ammonia recovery; and one must

admit that the methods are far ahead of those adopted for ammonia recovery on gas-works. No scrubbing plant is here required, and no water; and so alone, the annual saving on a big installation would be enormous. Apparently, too, according to several observers, the quality of the gas is not affected.

It is to be hoped that in the near future some enterprising gas-works will come forward and adopt one of these modern plants for ammonia recovery. Once adopted, the development will be very rapid indeed.

THE LOSS OF AMMONIA FROM ITS SOLUTION.

By A. V. Hendrickson.

In view of the statements that have recently been made with regard to the loss of ammonia that occurs when a solution containing it is heated, the experiments detailed below were made to gain further information on this point.

R. Rempel ("Zeits. f. angew. Chemie," 1889) stated that a solution of semi-normal ammonia may lose about 20 per cent. of its content of ammonia in five minutes, when exposed to the air in a shallow porcelain basin at ordinary temperatures. Quite recently J. T. Sheard stated that in twenty-four hours, with a still atmosphere, 3 to 5 per cent. of the amount exposed may be lost; while in the "Journal of Gas Lighting" for May 9, G. M. Gill reports the following figures obtained by heating a liquor containing 4 "ounces" free ammonia, and 8·4 "ounces" fixed ammonia. As, however, the "fixed" ammonia would not be affected by heating, the "free" only is considered. From the "ounce" strength figures given, the ammonia in grammes per 100 c.c. of liquor has been calculated:

Original strength	4·0	"ounces"	= 0·867	grammes per 100 c.c.	
Heated to 150° Fahr.	4·0	,,	= 0·867	,,	,, = 0·00 p. ct. loss
160° ,,	3·8	,,	= 0·824	,,	,, = 4·96 ,, ,,
176° ,,	3·3	,,	= 0·715	,,	,, =17·54 ,, ,,
184° ,,	3·0	,,	= 0·650	,,	,, =25·03 ,, ,,
194° ,,	2·8	,,	= 0·607	,,	,, =29·99 ,, ,,

No details are given as to the method of testing or of the vessel used.

In the following series of experiments, the test liquid was made by diluting ammonia solution of 0·88 specific gravity with distilled water. The strength of such solution was 9·6 "ounces," approximately, and contained "free" ammonia only.

For the experiments, three vessels were used—

(1) Glass beaker, 3½ inches diameter by 3 inches deep.
(2) Small narrow-neck flask, 3 inches greatest diameter; the neck being 2¼ inches long by ¾ inch diameter.
(3) Large porcelain evaporating dish—the diameter of the liquid being about 3½ inches, the greatest diameter of the dish being 5 inches.

The solutions were supported on the usual wire gauze, and gradually heated by an ordinary bunsen flame. The details of one experiment are shown in the beaker test below. Normal sulphuric acid was used for titrating, and the loss of ammonia is stated as a percentage of the original content.

—	Beaker.		Flask.	Dish.
	Grammes per 100 cc.	Total Loss per Cent.	Total Loss per Cent.	Total Loss per Cent.
Original	2·090	..	..	..
Heated to 100° Fahr.	1·768	15·4	0·0	8·2
120° ,,	1·717	17·8	0·0	20·1
140° ,,	1·666	20·3	..	31·1
160° ,,	1·632	21·9	0·0	..
180° ,,	1·445	30·9	2·6	33·7
200° ,,	1·105	47·1	7·7	49·0
210° ,,	0·935	55·3	25·5	66·0

As to the tests with the beaker and flask given above, the liquid was agitated after each addition of acid; and with the evaporating dish, mixture was brought about by the use of a glass stirring rod. This agitation, with large surfaces, causes a great loss of ammonia, as proved in the following experiment, in which the same quantity of the ammonia solution was placed in the evaporating dish and (1) titrated direct, the acid being run in until practically the neutral point was reached, and then mixed with the least possible agitation; and (2) titrated after stirring slowly with the stirring rod for one minute.

(1) Titrated direct = 2·00 grammes per 100 c.c.
(2) Titrated after storing = 1·87 ,, ,,

Loss. . . . . 0·13 ,, ,, = 6·5 per cent.

With this result in mind, the next series was made—avoiding agitation as much as possible during the titration; the acid being run in until the neutral point was almost reached, the last few drops being added with the minimum amount of stirring. The bulb of the thermometer was, in every case, rinsed with water on its removal from the solution.

—	Beaker.	Flask.	Dish.
	Total Loss of Ammonia per Cent.		
Heated to 100° Fahr.	2·4	1·04	8·0
120° ,,	3·7	1·04	10·7
140° ,,	3·7	1·88	16·2
160° ,,	10·4	3·29	31·0
180° ,,	18·5	3·43	31·8
200° ,,	23·1	5·64	82·5

The tests at 210° were omitted as the reading of the thermometer was not considered definite enough. It may be remarked here that the solution was heated with the thermometer suspended at about the centre of the depth of the liquid.

In the next tests, some of the ammonia solution was allowed to stand in the three vessels, on a shelf in the laboratory for twenty-four hours. The temperature of the room during this period did not vary more than 5° (60° to 65° Fahr.), and the solutions were not in a direct draught, other than that caused, during a part of the time, by people moving about.

The original solution, titrated in all cases immediately before the test, contained 2·108 grammes of ammonia per 100 c.c. After standing twenty-four hours—

The beaker contained 0·136 grammes = 93·6 per cent. loss
The flask ,, 1·870 ,, = 11·3 ,, ,,
The dish ,, 0·085 ,, = 96 0 ,, ,,

These tests are important as showing the effect of evaporating surface, the dish having lost 96 per cent. of its ammonia content in twenty-four hours.

The following figures were obtained with actual samples of ammoniacal liquor. They were heated in the same vessels as previously, account being taken of the "free" ammonia only.

Ounce strength, "free"	4·31		5·72		
Grammes per 100 c.c.	0·935		1·241		
—	Flask.	Dish.	Beaker.	Flask.	Dish.
Heated to 100° F., total loss p. ct.	0·0	2·84	0·00	0·0	2·76
,, 120° ,,	0·0	..	1·37	0·0	..
,, 140° ,,	0·0	8·39	2·74	0·65	6 90
,, 160° ,,	..	12·97	8·22	0·65	12·34
,, 180° ,,	..	24·08	13·70	0·65	27·60

Further samples of other liquors were then exposed on the Laboratory shelf for the given period.

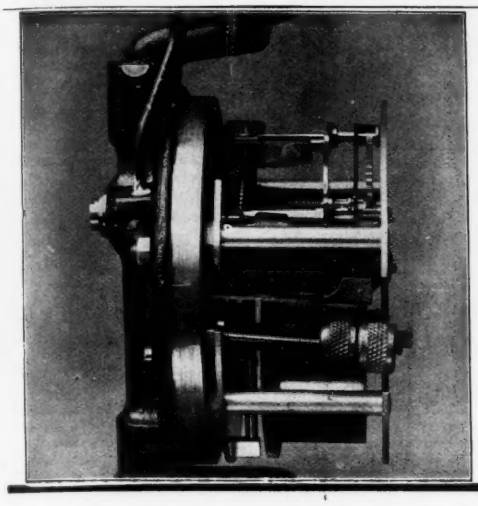
Ounce strength, "free"	6·03	8·62
Grammes per 100 c.c.	1·309	1·87
Temperature	70°	75°
Time exposed, hours	2	40
Beaker, total loss per cent.	8·5	73·21
Flask	1·9	18·19
Dish.	13·9	100·00

The tests therefore show that considerable loss of ammonia occurs when its solution is exposed to an atmosphere free from direct draughts; such loss, even after the lapse of but two hours, amounting to 14 per cent. where the surface exposed is large. Large losses also occur on agitation; a liquor of approximately 9-oz. strength, "free" ammonia, having lost 6·5 per cent. after one minute's gentle agitation in the cold. With hot liquor the loss is considerably greater.

The method of heating has also large influence on the ammonia driven off, as apparently also does the depth of the liquid.

Presentation to Mr. G. Marvin.

The current number of the "Co-Partners' Magazine" of the Gaslight and Coke Company contains an account of a recent presentation to Mr. G. Marvin, who at the end of last year retired from the position of Divisional Mains Inspector in the Distributing Engineer's Department of the Company, after 45 years' service. The testimonial took the form of a handsome English eight-day mahogany chiming clock, bearing the following inscription: "Presented to G. Marvin, Esq., by Fellow-Officers and Employees, as a token of esteem, on his retirement from the service of The Gas Light and Coke Company, 31st December, 1910;" together with a pair of electro-plated candlesticks. It was subscribed for by officers and employees in the distribution and gas sales departments. The presentation, which took place at the Chief Office, Horseferry Road, was made by the Distributing Engineer (Mr. H. S. Reeson). In asking Mr. Marvin's acceptance of the gifts on behalf of the subscribers, he expressed the hope that Mr. Marvin would be spared for many years to enjoy his well-earned retirement, and referred to the valuable assistance Mr. Marvin had always given him. The Controller of the Sales Department (Mr. F. W. Good-enough) desired to associate himself with everything Mr. Reeson had stated. He also, he said, had had pleasant recollections of Mr. Marvin in connection with the Provident Club and other matters. Mr. Marvin briefly thanked the subscribers. He remarked that he was born in 1849 on the site of the old London Gas-Works at Vauxhall, where his father was Manager, entering in 1865 the service of the Company, which was amalgamated with the Gaslight and Coke Company in 1883.



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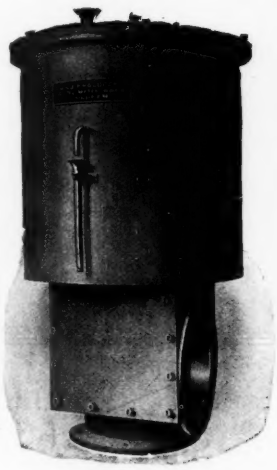

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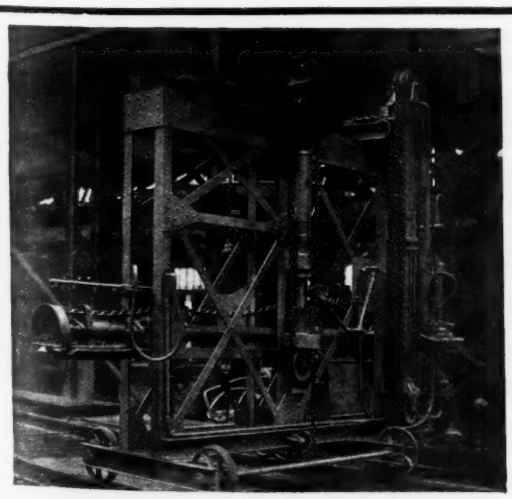

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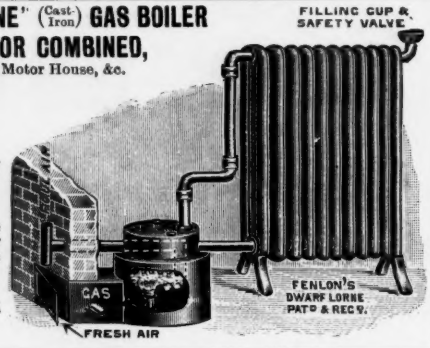

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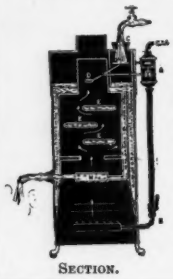

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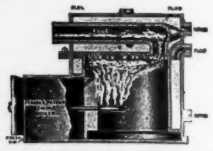

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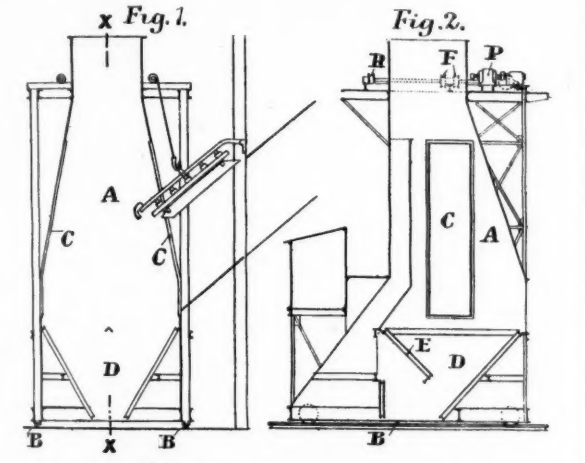
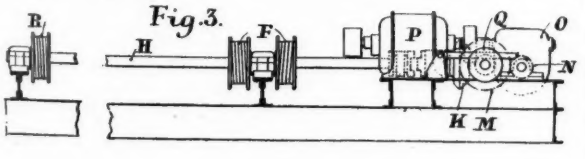
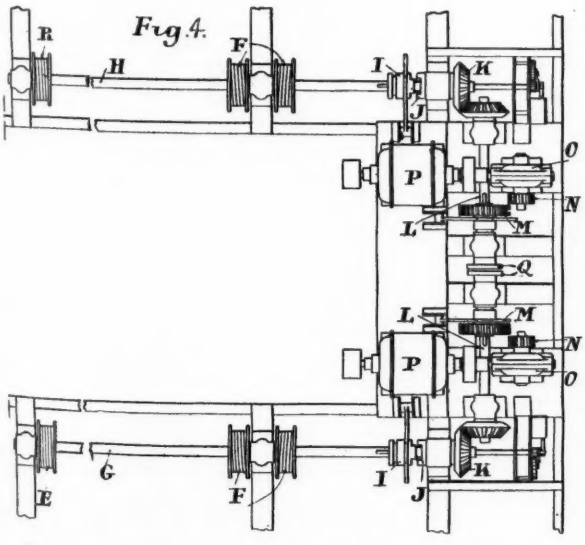
RAISING THE DOORS OF CHAMBER RETORTS.

The system at present employed to open the discharging doors of chamber retorts consists of lifting appliances, moving on gangways constructed along the two parallel benches of retorts, and worked by suitable mechanism, preferably driven by electricity. Sufficient space must be left between the gangways to allow free passage of the truck in which the coke is carried away to be quenched. The plant consequently requires not only a set of lifting appliances with a motor for each bench of retorts, but one or more reserve motors to be in readiness in case some of those in use get out of order or are not sufficient. Moreover, the plant must have a special site for the passing of the lifting apparatus between the front of the setting and the coke truck. The Compagnie Générale de Construction de Fours, of Paris, have patented in France a device which makes it possible to reduce the space needed for the plant, and consequently the cost of its installation, while at the same time giving the maximum degree of safety in normal working of the discharging doors of the chambers. It consists, first, in utilizing the coke-truck as a movable support for the two sets of lifting appliances corresponding to the parallel benches of the same settings; and, secondly, in working these appliances by means of motors arranged so that they can either act separately for either of the two appliances or simultaneously for one of them. With the arrangement it is possible to dispense with stand-by motors, which are replaced by others which work.







The general arrangement of the plant is shown in the accompanying diagrams. Fig. 1 is a vertical section of a coke-quenching truck to which the device is adapted; fig. 2, a vertical section of the truck on the line X of fig. 1; fig. 3, a longitudinal section of the motor mechanism fixed on the truck; and fig. 4, a plan of the entire mechanism.

In order to quench the coke coming from the retort chambers, trucks are generally used, similar to that represented in figs. 1 and 2, running along a track B laid between the two benches of retorts. These trucks are made in the form of hoods or cowls, furnished along two of their sides with openings C through which the coke from the retorts is discharged. After having entered the box A, the coke falls into the hopper D formed by the hood at its top part, and thence on to a suitable conveyor. The steam and other products given off by the coke during its quenching or fall are discharged through the chimney inside the hood, passing under the inclined plate E (fig. 2). A truck, constructed as described, being run to the front of the chambers the coke from which has to be quenched, the doors are opened so as to cause them to enter the openings C, and then the mass of coke is pushed into the truck, where it is watered in any suitable way. To allow of the doors of the chambers being easily opened, they are furnished with bars to which hooks on the ends of the lifting-ropes are secured.

According to this invention, the winches F, on which the ropes are wound, instead of forming part of a machine moving along a gangway parallel to the front of the settings, are placed on an upper platform of the truck, which then serves as a movable support. The winches are arranged in pairs on two shafts G H, supported by the upper platform of the truck and on each side of the discharging shoot. Each of the shafts is furnished with a clutch I, revolving with it, which will engage with corresponding claws J on the axis of a bevel pinion K, with which gears another pinion, keyed on a transverse shaft L. This shaft carries a toothed wheel M, revolving with it, which can be moved along lengthwise so as to gear with a pinion N or be removed from it. The pinion is operated by a speed controller O, enclosed in a case, and worked by an electric motor P. Stoppage of the wheel M, in its two extreme positions of gearing and ungearing, is effected by means of a bolting lever, engaging with grooves made in the hub of the wheel.

The parts described form a group of motor mechanism to open the doors of one of the two benches of retorts in the same plant. Another group, exactly similar, is placed symmetrically on the platform of the truck to allow of the opening of the doors of the other bench. The shafts L of both groups are laid one after the other, and are separated in normal working. They are provided with plates Q, which, as will be explained later, can be connected by means of bolts or other suitable device.

When the winch drums F are to be set in motion to open the door of one of the chambers, the wheel M is made to engage with the pinion N, and the clutch I with the claws J of the pinion K. A motor having been started, its movement is transmitted to the transverse and longitudinal shafts connected with it, on which are the drums F—the ropes then acting to open the door, which remains motionless when quite open. To shut it, the mechanism being in gear, all that is necessary is to operate the current reverser so as to make the motor revolve in the opposite direction. The motor stops automatically just before the door is completely closed. Should the motor for one of the winches fail to work, the plates Q at the end of the transverse shafts are coupled up, and the controller connected with the useless motor cut off; the other controller being geared. Motion is then transmitted by the two transverse shafts to the longitudinal shaft opposite that of the motor at work. By this general arrangement, everything necessary to provide against the stoppage of a motor can be readily found on the truck itself. At a certain distance from the drums F, there are others R, to allow of the opening of the retort-doors outside the truck, in case of this being required for scurfing the framework of the door—an operation which could not be safely performed from inside the truck.

Jubilee Meeting of the North British Association.

The fiftieth annual meeting of the North British Association of Gas Managers will be held in the Philosophical Society's Hall, Bath Street, Glasgow, on Thursday; the date having been changed at the meeting held last year. We learn from the programme issued by the Secretary and Treasurer, Mr. Lawrence Hislop, of Uddingston, (which is an artistic production, in a coloured wrapper, with blank leaves for notes), that the proceedings will be opened by the President, Mr. George Keillor, of Broughty Ferry, at 10.30 a.m.; and, after the disposal of the usual routine business, he will read his Inaugural Address. The technical business will consist of two papers—"A Short Experience with Vertical Retorts at Helensburgh," by Mr. William Blair, of that town, and "Notes on the Attitude of the Air Question in Relation to Gas Manufacture, Purification, and the Reduction of Quality," by Mr. William Key, of Glasgow—and a discussion on "The Need of Publicity," to be opened by Mr. W. M. Mason, of Glasgow, and Mr. J. Napier Myers, of Saltcoats. In the evening, the members and their lady friends will dine together at the Atholl Restaurant in the Scottish Exhibition; and next day there will be an excursion to Arran. An interesting feature of the meeting will be the presentation of the appreciation of the late Mr. William Young, prepared by Dr. Alfred Daniell, which, however, will not be read or discussed, but be included in the "Transactions."

At the annual meeting of the Institution of Mining Engineers, to be held at Cardiff from the 13th to the 15th inst., the paper submitted at a previous meeting by Mr. Ernest Bury, on "The Otto-Hilgenstock Direct-Recovery Process and its Applications," an abstract of which was given in the "JOURNAL" for the 13th of June last (p. 748), will be open for discussion.

SOURCES OF ENERGY AND THEIR EXHAUSTION.

[Extracts from the Presidential Address of Sir William Ramsay at the British Association.]

The Eighty-First Annual Meeting of the British Association for the Advancement of Science was opened last Wednesday at Portsmouth, under the presidency of Sir William Ramsay, F.R.S., who took for the subject of his address, "The Sources of Energy." Having offered some remarks on the present position of science and education, the President reviewed the progress of chemistry; and in this connection he dealt with the attributes of radium as a source of energy. This led to speculation as to the extent of the world's supply of energy, and the exhaustion of the coal supply. These portions of the address are given below.

The Stored-Up Energy of Radium.

Attention has repeatedly been drawn to the enormous quantity of energy stored up in radium and its descendants. This in its emanation—niton*—is such that if what it parts with as heat during its disintegration were available, it would be equal to 3½ million times the energy available by the explosion of an equal volume of detonating gas—a mixture of one volume of oxygen with two volumes of hydrogen. The major part of this energy comes apparently from the expulsion of particles (that is, of atoms of helium) with enormous velocity. It is easy to convey an idea of this magnitude in a form more realizable, by giving it a somewhat mechanical turn. Suppose that the energy in a ton of radium could be utilized in thirty years, instead of being evolved at its invariable slow rate of 1760 years for half-disintegration, it would suffice to propel a ship of 15,000 tons, with engines of 15,000 H.P., at the rate of 15 knots an hour, for thirty years—practically the lifetime of the ship. To do this actually requires 1½ million tons of coal.

It is easily seen that the virtue of the energy of the radium consists in the small weight in which it is contained; in other words, the radium-energy is in an enormously concentrated form. I have attempted to apply the energy contained in niton to various purposes. It decomposes water, ammonia, hydrogen, chloride, and carbon dioxide, each into its constituents. Further experiments on its action on salts of copper appeared to show that the metal copper was converted partially into lithium, a metal of the sodium column. Similar experiments indicate that thorium, zirconium, titanium, and silicon are degraded into carbon; for solutions of compounds of these, mixed with niton, invariably generated carbon dioxide, while cerium, silver, mercury, and some other metals, gave none. One can imagine the very atoms themselves, exposed to bombardment by enormously quickly moving helium atoms, failing to withstand the impacts. Indeed, the argument *a priori* is a strong one. If we know for certain that radium and its descendants decompose spontaneously, evolving energy, why should not other more stable elements decompose when subjected to enormous strains?

The World's Supply of Energy.

This leads to the speculation whether, if elements are capable of disintegration, the world may not have at its disposal a hitherto unsuspected source of energy. If radium were to evolve its stored-up energy at the same rate that gun-cotton does, we should have an undreamt-of explosive. Could we control the rate, we should have a useful and potent source of energy, provided always that a sufficient supply of radium were forthcoming. But the supply is certainly a very limited one; and it can be safely affirmed that the production will never surpass half-an-ounce a year. If, however, the elements which we have been used to consider as permanent are capable of changing with evolution of energy—if some form of catalyzer could be discovered which would usefully increase their almost inconceivably slow rate of change—then it is not too much to say that the whole future of our race would be altered.

Great progress has been made during the past century in effecting the conversion of one form of energy into others, with as little useless expenditure as possible. Let me illustrate this by examples. A good steam-engine converts about one-eighth of the potential energy of the fuel into useful work; seven-eighths are lost as unused heat, and useless friction. A good gas-engine utilizes more than one-third of the total energy in the gaseous fuel; two-thirds are unecomically expended. This is a universal proposition: In order to effect the conversion from one form of energy into another, some energy must be expended uneconomically. It is eminently desirable, therefore, to keep the useless expenditure as small as possible. It can never equal zero; but it can be made small.

The middle of the Nineteenth Century will always be noted as the beginning of the Golden Age of Science—the epoch when great generalizations of the highest importance (philosophical, economic, and scientific) were made on all sides. Carnot, Clausius, Helmholz, Julius Robert Mayer abroad, and the Thomsons, Lord Kelvin and his brother James, Rankine, Tait, Joule, Clerk-Maxwell, and many others at home, laid the foundations on which the splendid structure has been erected. That the latent energy of fuel can be converted into energy of motion by means of the steam-engine, is what we owe to Newcomen and Watt. That the kinetic energy of the fly-wheel can be transformed into electrical energy, was due to Faraday; and to him, too, we are indebted for the reconversion of electrical energy into mechanical work. It is this power of work which gives us leisure, and which enables a small country like ours to support the population which inhabits it.

The Exhaustion of the Coal Supply.

We have in this world of ours only a limited supply of stored-up energy; in the British Isles a very limited one—viz., our coalfields. The rate at which this supply is being exhausted has been increasing very steadily for the last forty years, as anyone can prove by mapping the data given in the General Report of the Royal Commission on Coal Supplies (1906). In 1870, 110 million tons of coal were mined in Great Britain; and ever since then the amount has increased by 3⅓ million tons a year. The available quantity of coal in the proved coalfields is very nearly 100,000 million tons. It is easy to calculate that, if the rate of working increases as it is doing, our coal will be completely exhausted in 175 years. But, it will be replied, the rate of increase will slow-down. Why? It has shown no sign whatever of slackening during the last 40 years. Later, of course, it must slow-down, when coal grows dearer owing to approaching exhaustion. It may also be said 175 years is a long time. Why, I myself have seen a man whose father fought in the '45 on the Pretender's side nearly 170 years ago! In the life of a nation, 175 years is a span. This consumption is still proceeding at an accelerated rate. Between 1905 and 1907, the amount of coal raised in the United Kingdom increased from 236 to 268 million tons—equal to 6 tons per head of the population, against 3½ tons in Belgium, 2½ tons in Germany, and 1 ton in France. Our commercial supremacy and our power of competing with other European nations are obviously governed, so far as we can see, by the relative price of coal; and when our prices rise, owing to the approaching exhaustion of supplies, we may look forward to the near approach of famine and misery.

Other Sources of Energy.

Having been struck some years ago with the optimism of my non-scientific friends as regards our future, I suggested that a Committee of the British Science Guild should be formed to investigate our available sources of energy. This Guild is an organization founded by Sir Norman Lockyer, after his tenure of the presidency of this Association, for the purpose of endeavouring to impress on our people and their Government the necessity of viewing problems affecting the race and the State from the standpoint of science; and the definition of "science" in this as in other connections is simply the acquisition of knowledge, and orderly reasoning on experience already gained and on experiments capable of being carried out, so as to forecast and control the course of events, and, if possible, to apply this knowledge to the benefit of the human race. The Science Guild has enlisted the services of a number of men, each eminent in his own department, and each has now reported on the particular source of energy of which he has special knowledge. Besides considering the uses of coal and its products and how they may be more economically employed—in which branches the Hon. Sir Charles Parsons, Mr. Dugald Clerk, Sir Boverton Redwood, Dr. Beilby, Dr. Hele-Shaw, Professor Vivian B. Lewes, and others, have furnished reports—the following sources of energy have been brought under review: The possibility of utilizing the tides; the internal heat of the earth; the winds; solar heat; water power; the extension of forests, and the use of wood and peat as fuels; and, lastly, the possibility of controlling the undoubted, but almost infinitely slow, disintegration of the elements, with a view to utilize their stored-up energy.

However interesting a detailed discussion of these possible sources of energy might be, time prevents my dwelling on them. Suffice it to say that the Hon. R. J. Strutt has shown that, in this country at least, it would be impracticable to attempt to utilize terrestrial heat from boreholes. Others have deduced that from the tides, the winds, and water power small supplies of energy are, no doubt, obtainable; but that, in comparison with that derived from the combustion of coal, they are negligible. Nothing is to be hoped for from the direct utilization of solar heat in this temperate and uncertain climate; and it would be folly to consider seriously a possible supply of energy in a conceivable acceleration of the liberation of energy by atomic change. It looks utterly improbable, too, that we shall ever be able to utilize the energy due to the revolution of the earth on her axis, or to her proper motion round the sun.

Attention should undoubtedly be paid to forestry, and to the utilization of our stores of peat. On the Continent, the forests are largely the property of the State. It is unreasonable, especially in these latter days of uncertain tenure of property, to expect any private owner of land to invest money in schemes which would at best only benefit his descendants, but which, under our present trend of legislation, do not promise even that remote return. Our neighbours and rivals, Germany and France, spend annually £2,200,000 on the conservation and utilization of forests; and the net return is £6,000,000. There is no doubt that we could imitate them with advantage. Moreover, an increase in our forests would bring with it an increase in our water power; for without forest land rain rapidly reaches the sea instead of distributing itself, so as to keep the supply of water regular and more easily

* The President had explained, in a preceding portion of the address, that the formation of niton from radium would be represented by the equation: Radium (atomic weight 226·4) = helium (4) + niton (222·4).

utilized. Various schemes have been proposed for utilizing our deposits of peat. I believe that in Germany the peat industry is moderately profitable; but our humid climate does not lend itself to natural evaporation of most of the large amount of water contained in peat, without which processes of distillation prove barely remunerative.

Means of Economizing Coal.

We must therefore rely chiefly on our coal reserve for our supply of energy and for the means of supporting our population; and it is to the more economical use of coal that we must look in order that our life as a nation may be prolonged. We can economize in many ways—by the substitution of turbine engines for reciprocating engines, thereby reducing the coal required per horse power from 4 or 5 lbs. to 1½ or 2 lbs.; by the further replacement of turbines by gas-engines, raising the economy to 30 per cent. of the total energy available in the coal (*i.e.*, lowering the coal consumption per horse power to 1 or 1¼ lbs.); and by creating the power at the pit mouth, and then distributing it electrically, as is already done in the Tyne district. Economy can also be effected in replacing beehive coke-ovens by product-recovery ovens. This is rapidly being done; and Dr. Beilby calculates that in 1909 nearly 6 million tons of coal out of a total of 16 to 18 millions were coked in recovery ovens—thus effecting a saving of 2 to 3 million tons of fuel annually. Progress is also being made in substituting gas for coal or coke in metallurgical, chemical, and other works. But it must be remembered that for economic use gaseous fuel must not be charged with the heavy costs of piping and distribution.

The domestic fire problem is also one which claims our instant attention. It is best grappled with from the point of view of smoke. Though the actual loss of thermal energy in the form of smoke is small—at most less than one-half per cent. of the fuel consumed—still the presence of smoke is a sign of waste of fuel and careless stoking. In works, mechanical stokers which ensure regularity of firing and complete combustion of fuel are more and more widely replacing hand-firing. But we are still utterly wasteful in our consumption of fuel in domestic fires. There is probably no single remedy applicable; but the introduction of central heating, of gas-fires, and of grates which permit of better utilization of fuel, will all play a part in economizing our coal. It is open to argument whether it might not be wise to hasten the time when smoke is no more by imposing a fine of 6d. for each offence. An instantaneous photograph could easily prove the offence to have been committed; and the imposition of the fine might be delayed until (say) three warnings had been given by the police.

The members of the Coal Commission in 1903 showed the gravity of our case; but we have turned a deaf ear to them. It is true that the self-interest of coal consumers is slowly leading them to adopt more economical means of turning coal into energy. But I have noticed, and frequently publicly announced, a fact which cannot but strike even the most unobservant. It is this: When trade is good, as it appears to be at present, manufacturers are making money. They are overwhelmed with orders, and have no inclination to adopt economies which do not appear to them to be essential, and the introduction of which would take thought and time, and would withdraw the attention of their employees from the chief object of the business—how to make the most of the present opportunities. Hence improvements are postponed. When bad times come, there is no money to spend on improvements; and so they are again postponed until better times arrive.

The Squandering of National Resources.

What can be done? I would answer: Do as other nations have done and are doing—that is, take stock annually. The Americans have a permanent Commission, initiated by Mr. Roosevelt, consisting of three representatives from each State, the sole object of which is to keep abreast with the diminution of the stores of natural energy, and to take steps to lessen its rate. This is a non-political undertaking, and one worthy of being initiated by the ruler of a great country. If the example is followed here, the question will become a national one. Two courses are open to us: First, the *laissez-faire* plan of leaving to self-interested competition the combating of waste; or, second, initiating legislation which, in the interest of the whole nation, will endeavour to lessen the squandering of our national resources. This legislation may be of two kinds—penal, that is, imposing a penalty on wasteful expenditure of energy supplies; and helpful, that is, imparting information as to what can be done, advancing loans at an easy rate of interest to enable reforms to be carried out, and insisting on the greater prosperity which would result from the use of more efficient appliances. This is not the place, nor is there the time, to enter into details. The subject is a complicated one, and it will demand the combined efforts of experts and legislators for a generation. But if it be not considered with the definite intention of immediate action, we shall be held up to the deserved execration of our not very remote descendants.

Methods of Concentrating Energy.

The two great principles which I have alluded to in an earlier part of this address must not, however, be lost sight of. They should guide all our efforts to use energy economically. Concentration of energy in the form of electric current at high potential makes it possible to convey it for long distances through thin, and therefore comparatively inexpensive, wires; and the economic coefficient of the conversion of mechanical into electrical, and of electrical into mechanical energy is a high one—the useless expenditure not much exceeding one-twentieth part of the energy which can be utilized. These considerations would point to the conversion at the pit mouth of the energy of the fuel into electrical energy; using as an intermediary turbines, or preferably gas-engines, and distributing the electrical energy to places where it is wanted. The use of gas-engines may, if desired, be accompanied by the production of half-distilled coal—a fuel which burns nearly without smoke, and one which is suitable for domestic fires, if it is found too difficult to displace them, and to induce our population to adopt the more efficient and economical systems of domestic heating which are used in America and on the Continent. The increasing use of gas for factory, metallurgical, and chemical purposes points to the gradual concentration of works near the coal mines, in order that the laying-down of expensive piping may be avoided. An invention which would enable us to convert the energy of coal directly into electrical energy would revolutionize our ideas and methods; yet it is not unthinkable. The nearest practical approach to it is the Mond gas-battery, which, however, has not succeeded, owing to the imperfection of the machine.

A Plea for the Study of Pure Science.

In conclusion, I would put in a plea for the study of pure science, without regard to its applications. The discovery of radium and like radioactive substances has widened the bounds of thought. While themselves, in all probability, incapable of industrial application, save in the domain of medicine, their study has shown us to what enormous advances in the concentration of energy it is permissible to look forward with the hope of applying the knowledge thereby gained to the betterment of the whole human race. As charity begins at home, however, and as I am speaking to the British Association for the Advancement of Science, I would urge that our first duty is to strive for all which makes for the permanence of the British Commonweal, and which will enable us to transmit to our posterity a heritage not unworthy to be added to that which we have received from those who have gone before.

INCREASING EFFICIENCY OF WATER-GAS PLANT.

By J. S. Haug, of Montreal.

[A Paper read before the Canadian Gas Association.]

The problem of increasing the efficiency of water-gas plant is not always one for elaborate mathematical calculations, as one might suppose in these days of scientific methods. Of course, these calculations are necessary to ultimately obtain the best results; but one can often make great improvements by simply locating and eliminating unexpected causes of trouble that are not taken account of at all in calculations. These troubles may be of the most unexpected and surprising nature, and may be due to accident, to carelessness in operation, or minor defects not easily detected; and they must be rectified before any permanent improvement can be obtained. This was the case in the plant under consideration, which consists of four sets of the Merrifield-Wescott-Pearson type, with oval generators 8 ft. 6 in. by 11 ft. The superheater is built above the carburettor, and the oil is injected into a space between the two; some of it trickling down against the current of gas, and some of it being carried up to the superheater.

The principal dimensions of the machines are as follows: Grate surface, 45 square feet; depth of fire, 7 ft. 6 in.; fixing surface of carburettor, 1200 feet; do. of superheater, 5100 feet; air connection, 12-inch; steam connections, 1¼-inch; diameter of down pipe, 14 inches; blast pressure at fan, 27½ inches water-gauge. The guaranteed capacity of the machines was 1,000,000 cubic feet per day with broken anthracite, and 800,000 cubic feet per day with gas coke. At the time the present management took charge, these machines were making 600,000 cubic feet per day, and at present they are making 1,300,000 cubic feet.

The conditions found in the machines were as follows: They were badly choked with clinker; in some cases the thickness was as great as 18 inches, reducing the grate area by 60 per cent. Each machine was clinkered once in twelve hours; the time of clinkering was about three hours. Once a week it was necessary to let down a machine to remove the accumulation of clinker formed on the side of the brick lining. The time consumed in removing this clinker was 12 hours, and in several cases it took 24 hours. The supply of steam to the machines was restricted by small piping and a three-way cock designed to deliver the steam either to the top or the bottom of the generator. The method of running was to blow four minutes and steam five minutes; and with such a high blast pressure and restricted steam, these conditions accounted to a great extent for the hard clinker. There was also considerable trouble with the fire-bars and bearer-bars. One down-run was made for about every six up-runs.

The first change was to alter the time of running to three minutes blow and six minutes steam, and to make one down-run for every three up-runs. Under the old way of running, there were nine hours of gas making out of every twelve; and with 6⅔ runs per hour there were 60 runs of five minutes each, giving 300 total minutes of steaming. Under the new arrangements,

the time of clinkering was 1½ hours, giving 10½ hours gas making out of 12 hours; and with 6⅔ runs per hour there were 70 runs of six minutes each, giving 420 total minutes of steaming—an increase of 40 per cent.

The next step was to do away with the three-way valve, and substitute two independent valves—one for the up-run and one for the down-run. To these changes was added the increase of grate area to the normal. This was due to the more efficient clinkering now made possible. A great increase in the make of gas was obtained; but it was found that the stack-valves leaked badly, especially when two machines lapped. This was due to a heavy back-pressure. The connections to the condensers, &c., were 16 inches in diameter from each machine, and very tortuous and complicated. The inlet and outlet pipes to the relief holder were 20-inch and 16-inch, and full of bends; but even these small pipes could not be held accountable for the heavy back-pressure. Some pressure readings were taken along the inlet to the relief holder; and it was found that while the holder only threw 6½ inches, there was a violently fluctuating pressure of about 36 inches just at the holder inlet. The inlet was dug up, and the cause of the pressure brought to light in the shape of a large block of concrete which almost entirely closed the pipe. The only explanation anyone could give for its presence was that it had fallen in during repairs and partial reconstruction of the holder. After this there was very little trouble from leakage from the stack-valves, except when three machines lapped which were connected to the same condensers.

The next step was to provide some means of measuring the air supply and the steam supply to the machines, and so ensure uniformity of operation. It is well known that in a fire of uniform structure, without holes or black eyes, the rate of combustion and heat evolved is proportional to the quantity of air supplied, so that if the same quantity of air is supplied every blow, the same amount of heat will be produced in the machine. The usual way to regulate the amount of air supplied is by opening the blast-valve a certain number of inches or the same amount each time. It is also well known that, owing to the increase of resistance due to clinker in the fire, a clean machine will take a much larger quantity of air than a dirty machine with the blast-valve open to the same extent in each case. The result is that the clean machine takes more air than its share; and this tends not only to waste fuel, but to fuse the clinkers into a hard slag. Again, when the machine is dirty, it takes less than its share of air, and the heats fall rapidly unless the steam is correspondingly reduced. A dirty fire will always make less gas than a clean one, because the air and steam that should be forced through the fire partially escape through dead spaces in the fire which may exist below the surface, even if they are not visible as black eyes. Then if to this is added an actual decrease of air supplied, it is no wonder that the make of a machine drops rapidly a few hours after clinkering.

This latter cause of decreased make can be absoluely removed, and considerably more uniform results obtained, by measuring the air. There are two kinds of air-meters in use. One is the Venturi meter, which has been employed on water since about 1887; and the other is the Pitot tube, which was originally used on water. [The author described these meters.] The latter type of meter was the one we adopted, as there was no place in which to put up a Venturi meter. The Pitot tube was inserted into the air-pipe for a distance of one-third the diameter, to give about the average velocity. The velocity-tube was connected to one side of a water-gauge, and the pressure-tube to the other side. In operating the machine, the gas maker was instructed not to open his blast-valve until he got a certain differential pressure on the gauge, and to pay no attention to the number of notches on his valve-stem. One of the first results was to show that the carburettor blast robbed the generator blast; in other words, the supply-pipe was a little too small.

The argument for air-meters applies to steam-meters in the same degree. The usual way of running before was to open the steam-valve about a turn-and-a-half. If the steam pressure was low on the boilers, the make would drop away without any apparent cause. The steam-meter adopted was a standard diverging tube turned from brass, and screwed in place of the nipple going into the shell of the machine. There were four of these tubes to each machine—two for the top and two for the bottom steam. The pressure on the meters was obtained by ¼-inch gauge-pipes running from the meters to the operating floor, with two steam-gauges to each machine. When the gas maker opens the steam-valve, he can see just what pressure he is putting on the meters; and if the steam is down, he opens the valve a little wider.

The meters were not on the first machine very long before it was seen the 1¼-inch pipes were too small; so the next machine was equipped with 1½-inch pipes and larger meters. It was now possible to reduce the time of steaming to five minutes (owing to the increased flow obtained), while retaining the blow at three minutes. This increased the number of runs per hour from 6⅔ to 7½—increase 12·4 per cent. With this machine, 740,000 cubic feet of gas were made between cleanings on one occasion, equivalent to a make of 1,480,000 cubic feet per day.

The most important use of steam and air meters is to keep conditions constant, and to make it always possible to reproduce any condition. The knowledge of the actual amounts of air and steam passed is quite a secondary consideration, though also important. Nothing has been done in this respect as regards exact calibration of the meters, owing to press of reconstruction work; and no tests have been made on the machines as regards steam and air consumption for a given make of gas. Accounts of similar tests have appeared many times in the Technical Press. But it is always instructive to make them on a given plant, as indicating directions in which improvement can be effected; and they will be carried out when an opportunity is afforded.

Several other improvements have been made in matters which, though outside the province of gas generation, are vital to its successful manufacture. The original relief holder of 60,000 cubic feet capacity was far too small for the amount of water gas made; and our smallest commercial holder of 360,000 cubic feet capacity was converted to this purpose—thus giving more space for cooling the gas and separating out of tar fog. The old exhausters were of the reciprocating type, built by Messrs. R. & J. Dempster, and had given first-class service for twenty years. After the make of gas was increased, they flew to pieces several times, and were finally replaced by a 5 million cubic feet exhauster of the rotary four-blade type built by Waller and Son. A Pelouze and Audouin tar-extractor was added to the equipment, and eliminated a great deal of trouble in purification caused by fouling of the oxide with tar. The old condensers were inadequate for the amount of gas made, and gas frequently went into the purifiers at 140° Fahr. A set of four condensers, arranged two in tandem, with about 8300 square feet of total cooling surface, has been put into the room next to the generators, and the gas is cooled down to about 115° Fahr. A 24-inch steel header runs behind the machines with a 20-inch branch to each, and forms the inlet to the condensers. This header replaces the old combination of 16-inch and 20-inch piping from the machines.

The overflows from the wash-boxes are now being re-arranged at the stage-floor level, so that the machine man can see if any oil is coming through unfixed; and an 8-inch pipe to the tar-separators replaces the present one, which is 4 inches diameter. A 4-inch water-main has been connected to the inlet of the condensers, with a 3-inch branch to each. This does away with a perfect network of 1-inch, 1¼-inch, and 1½-inch piping behind the machines. The overflow water from the condensers furnishes a good supply to the boilers at 170° Fahr.; and the surplus runs to the sewer. In winter there will probably be just about enough for the boilers. In addition, it is proposed to replace the present underground galvanized iron blast-pipe with overhead steel piping with explosion heads. The present piping is full of holes, and water accumulates in it quickly when the plant is shut down.

The fuel supply to the machines, which is gas coke, is obtained from the coke-storage hopper by a runway at the stage-floor level. There is, however, no convenient way of elevating the unburnt fuel recovered from clinkering. This deficiency will be supplied, and the fuel consumption can be somewhat reduced. After these things are done, experimental work on the machines will probably be continued, with a view to increase still further the gas-making capacity.

Coal Tar Oil as Locomotive Fuel.

A note has recently appeared in the "Frankfürter Zeitung" with reference to the smokiness of the coal now used as fuel on locomotives, and its ill-effects on the atmosphere and thence on vegetation and the public health. The disagreeable character of the air in railway tunnels is pointed to as proof of the objectionable character of the smoke; and the sulphur acids in it are said to be injurious even in the country, and still more so in the already vitiated air of towns. The electrification of railways would in this respect constitute a great advance, but from the military standpoint, the independent steam locomotive is preferred, because the mere cutting of an electric cable by the enemy would render the whole section of an electrified line useless. On the other hand, the adoption of a smokeless fuel for steam locomotives would overcome the hygienic objections to the present system. Tar-oil is mentioned as being a suitable fuel; and it is reported that the Prussian State Railway Administration has equipped a number of locomotives with apparatus for oil firing. The tar-oil, which is a distillate from ordinary coal-tar, has a higher calorific power than coal—about 16,200 B.Th.U. per pound. On the other hand, its price is much lower than that of foreign gas-oil. Practical trials have demonstrated that the increased efficiency realizable with oil-firing renders oil a competitor with coal in respect of price. The production of tar-oil in the German Empire is said to amount to 450,000 tons per annum. This oil has recently found extensive application as fuel in Diesel engines; and it now seems possible that it may be used for locomotive firing in Germany, just as the petroleum residue or Masut is used for the purpose in Russia.

Testing the Calorific Power of Paris Gas.—The current number of "Le Gaz" contains an illustration, accompanied by a few particulars, of the apparatus which has been put up in the testing-rooms of the Paris Gas Company, under instructions from the municipal authorities, for making daily tests of the calorific power of the gas, in accordance with directions issued by the Municipal Testing Laboratory. The calorimeter is of the Junkers type, and the burner is a Méker. Similar installations have been put up by the Company in their works, in order to allow of check tests being made. It is not intended to abandon for the present the photometric apparatus, as it is thought that simultaneous tests of the lighting and heating power of gas will probably show an interesting relation between these two qualities of the illuminant. The installation has been supplied by MM. Velter Frères et Cie., of Paris.

MANCHESTER JUNIOR GAS ASSOCIATION.

Inspection of a Model Gas-Works at Eaton Hall.

The Council of the Manchester and District Junior Gas Association arranged a picnic for members to Chester last Saturday; the programme including a visit to Eaton Hall and grounds and an inspection of the model gas-works on the estate. Mr. J. C. Belton, Engineer to the Chester Gas Company, met the party (which included a number of ladies) at Chester Station, and acted as guide through the city to the landing stage on the River Dee, where the steamer was boarded for a sail up to Eccleston Ferry. The majority of the male members proceeded after landing to the gas-works on the Duke of Westminster's estate; and the other section made a visit to the Hall and gardens. Mr. E. K. Willett, Clerk of Works for the Duke, took charge of those who decided to inspect the gas-works, which are situate on the banks of the river. It is only a small plant, but a very complete model of a gas-works. The buildings are substantial in construction, and have an ornate frontage. Last year, under the supervision of Mr. Belton, a new plant, supplied by Messrs. R. & J. Dempster, was put down.

Prior to the actual inspection of the works, Mr. Belton, for the benefit of those present, gave a brief description of them before the extensions were carried out, and as they are now.

Works as they were:—Retort-house, 13 retorts, 4-inch mountings, capacity 40,000 to 50,000 feet per diem. No exhauster. Two 8-inch outlets for hydraulic main, reduced outside to 5 inches, and connected to a horizontal condenser much too small, tar passing forward into the scrubber. Area of the two sets of condensers, 200 super. feet, or just half the theoretical area of 400 super. feet. The scrubber, coke filled, was occasionally supplied with water by pumping, but was clogged with tar. There were four purifiers, 5 ft. by 3 ft. by 2 ft. 6 in., which could only be worked as two pairs—too small to be effective. There was no washer.

Works as they now are:—Retorts as before, but with 6-inch mountings. One 8-inch outlet from the hydraulics. Two tube annular condensers, 18 feet. Tubes, 21 in. by 30 in. Exhauster, 2000 feet per hour, gas-engine driven single-blade "Beale." Hydraulic governor, countershaft, pulley, and belt to drive pump. Vertical liquor pump, 2 inches diameter, 4 inches stroke. Livesey washer for 100,000 cubic feet per diem. Four Green's purifiers. Continuous box, each 6 ft. by 3 ft. by 3 ft. Two tiers of grids. Three-inch tar-drain to tar-tank in yard from seal-pots. The old scrubber was cleaned out and re-filled; the 4-inch connections being removed and 6-inch ones substituted.

There are two holders; and the consumption, Mr. Willett said, in reply to a question, is about 3½ million cubic feet.

Subsequently the party visited the "rival show," as Mr. Willett described it, the model electricity works, and then had an opportunity of seeing in a neighbouring shed part of the rolling stock of the toy railway which runs from Balderton, about 3½ miles away, to Eaton. The railway is 15-inch gauge, and is used to bring up from Balderton coal (about 2000 tons a year) and other material required on the estate. It should be added that the gas-works and the electric power station not only supply the needs of the Hall, but the different buildings on the estate.

At the conclusion of the inspection, Mr. Willett was cordially thanked for his courtesy by Mr. A. H. Holton, President of the Manchester and District Junior Gas Association, on behalf of the members—supported by Mr. J. Alsop, the Hon. Secretary, and Mr. Belton. After having tea together at the Iron Bridge, the party returned to Chester by steamer, and spent the intervening period to train time in viewing the Rows in the City or the walls. Altogether it was a very pleasant half-day; the weather conditions being all that could be desired.

Coal Resources of the Pas de Calais.—On the occasion of the congress of the Société de l'Industrie Minérale, some interesting particulars relating to the Pas de Calais coalfield were published by the Chamber of Collieries of the Nord and the Pas de Calais. They showed that the production of coal last year was 19,900,549 tons of various qualities; the fat gas coal containing from 30 to 33 per cent. of volatile matter. There were in operation 1240 bye-product coke-ovens, and 302 ovens without recovery. The quantities of products were: Tar, 32,451 tons; benzol, 5696 tons; and sulphate of ammonia, 13,674 tons. The daily output of the briquette factories was 2136 tons.

Rules as to Chimneys.—Some rules regarding chimneys are given in a paper read before the Franklin Institute by Mr. H. C. Brinckerhoff. One rule is that a chimney 100 feet high will give a draught at the base of 0·6 inch of water. This assumes 60° air temperature and 450° stack temperature. This latter is a trifle low for average conditions, and in many cases it would be safe to estimate on 0·7 inch, though in designing new plant it is always wise to have plenty of draught rather than too little. For any other height of chimney, the draught is just in proportion to the height of the chimney, measured, of course, above the grate. These figures assume reasonable cross-sectional area; otherwise the chimney will absorb a considerable proportion of its own draught. The author suggests from 16 to 20 square feet per 1000 H.P., though half of these areas has frequently proved sufficient. The horse power is apparently based on 4 lbs. of coal per horse-power-hour.

REGISTER OF PATENTS.

Retorts.

EMANUEL, P. A., of Aiken, South Carolina, U.S.A.

No. 18,201; July 30, 1910. Date claimed under International Convention, Aug. 2, 1909.

This invention relates particularly to the class of retort utilized for the treatment of all kinds of clays, bauxite, corundum, and similar ores—in fact, it is of general application in the process of making soda, a double sulphate of soda and alumina, aluminium fluoride, metallic sodium, aluminium, gas, coke, gas-retort carbon, and for many other purposes.

The retort is capable of being heated to an exceedingly high temperature, and the simplicity of the structure is said to be so predominant that the replacing of any broken or damaged part is rapidly and easily accomplished. Another object of the invention is to provide means for mixing and stirring the contents of the retort at any desired time whether it be at a high temperature or not.

The invention consists in constructing a furnace portion and a smoke-stack connection portion both adapted to detachably connect with the retort at opposite ends so as to permit of the retort being effectively heated, while the removal of the furnace portion and the smokestack connection portion completely detaches the retort from the heating means and renders it capable of being rotated on its transverse axis for the purpose of mixing the products in it.

The invention also includes the provision of a perforated plate so arranged as to prevent the coal or other fuel from getting from the furnace into the retort; the provision of an asbestos covering, held in place by wire netting around the retort itself; and the arrangement of the entire apparatus, and suspending means, so that the apparatus may be moved bodily from one part of the plant to the other.

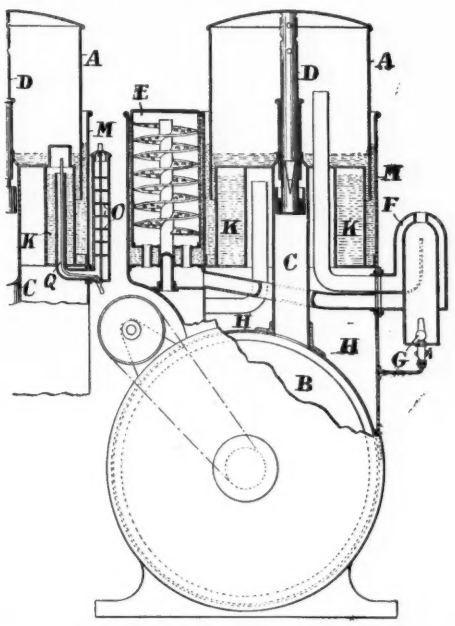
Air Carburetting Apparatus.

WILLIAMS, J., of Newport Pagnell.

No. 18,735; Aug. 9, 1910.

This invention relates to a special construction of mixing-chamber wherein the less volatile ingredient of the carburetting liquid has "a prolonged opportunity of becoming evaporated by the air on its entry to the mixing-chamber while at its highest temperature." The invention also comprises the provision of a tank for the carburetting liquid, which tank is immersed in the water which serves to provide the liquid-seal and vary the air-occupied volume of the bell-chamber.

The apparatus is shown in vertical sectional elevation, taken through the mixing-chamber and the air-heating or drying contrivance, and taken along another vertical plane so as to show the means provided for re-charging the carburetting storage vessel.



Williams' Air-Carburetting Apparatus.

A is a floating bell-chamber to which air is supplied by a rotary blower B through a pipe C and a telescoping pipe D secured to the roof of the bell-chamber; admission to the bell-chamber through a slit and apertures being closed by a mercury seal when the bell-chamber is fully charged. This portion of the apparatus forms the subject of patent No. 17,416 of 1910, and is there particularly described.

The bell-chamber is in permanent communication with one mixing-chamber E by a pipe leading from the bell-chamber and another pipe leading to the lower end of the mixing-chamber E; the two pipes being interconnected by an annular space F surrounding a heating chamber within which some of the carburetted air manufactured by the apparatus is consumed at a burner G capable of being regulated by hand or by a thermostat. The mixing-chamber E (which is a vertical cylinder) contains a helical surface the upturned external border of

which fits the cylindrical chamber. The inner border of the helical surface is secured to a vertical tube which serves to convey to a storage chamber H the carburetted air from the upper end of the mixing-chamber. The helical surface is perforated by a number of apertures which, being produced by a punch which is forced upwards through the metal of the helical surface, are formed with upwardly directed borders which prevent liquid flowing downwards along the helical surface from falling through the apertures.

Carburetting liquid is delivered to the mixing-chamber E by being dropped on to the higher portion of the helical surface, from which it descends along the helical surface and becomes evaporated on the way by the up-flowing air which passes partly along the space between the convolutions of the helical surface and partly through the apertures, the intermixture of the streams "serving to produce a very homogeneous product." The resulting carburetted air is delivered to the storage chamber H.

By the contra-flow of the carburetting liquid and air, prolonged by the circuitous route provided, the less volatile ingredient of the carburetting liquid will, it is said, have augmented opportunity to undergo evaporation, as it will eventually meet the incoming air in its warmest condition and without carburetting vapour in suspension.

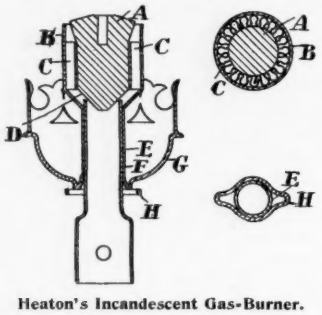
The carburetting liquid may be fed by any suitable devices, but preferably it is fed at a rate proportional to the air supply according to an arrangement which forms the subject of patent No. 18,057 of 1910. The liquid is stored in an annular vessel K which is immersed in water contained in a tank M, into which dips the lower border of the chamber A to a depth which depends on the air-occupied volume of the bell-chamber. The vessel K is re-charged by means of a U-shaped passage, which comprises an external branch in which is fitted a removable filter consisting of a series of wire-gauze shelves O carried on a rod. The inner branch of the U-passage rises to the level of the carburetting fluid in the vessel K when fully charged.

Incandescent Gas-Burners.

HEATON, C., of Skegness.

No. 428; Jan. 6, 1911.

This invention relates to incandescent gas-burners in which a central block is surrounded by a strip of corrugated metal and in which the block is itself cone-shaped at the bottom, with means to allow the relative movement between the block and the mixing-tube to regulate the amount of mixture passing up the sides of the block.



Heaton's Incandescent Gas-Burner.

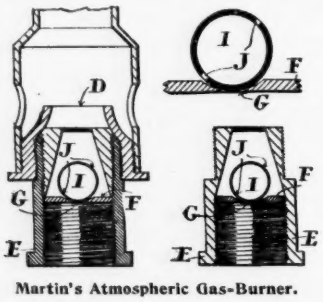
The block A is located (as usual) in the burner cup B and held therein by a corrugated, and preferably sheet-iron strip, bent round into an annulus C. The block has a conical bottom D. The mixing-tube E fits with a sliding fit in the tube F which connects the cup B and the gallery G and projects up beyond the bottom of the cup B. On the bunsen tube is arranged a spring clip H, upon which the gallery G or bottom of the tube F rests. By adjusting the clip on the bunsen tube, the tube F, and therefore the tube B, the block A, and its bottom D, will be adjusted relative to the top of the bunsen tube, and so the flow of the mixture of air and gas will be regulated. This regulation is found, in addition to regulating the flow of the gases, to regulate the mixture, and so dispense with the necessity of valves for regulating the amount of air admitted to the bunsen tube.

Atmospheric Gas-Burners.

MARTIN, W., of Manchester.

No. 1280; Jan. 18, 1911.

This invention has particular reference to the type of burner provided with a bunsen tube having air inlet holes at the sides near its lower end and a nipple or gas-nozzle at its extreme lower end—the invention consisting in providing a regulator of the floating ball type



Martin's Atmospheric Gas-Burner.

within a nipple or thimble secured to the nozzle for regulating the passage of gas towards the bunsen tube in accordance with the pressure of the gas from the supply pipe.

The bunsen burner-tube is of the ordinary construction, except that the disc at the upper end of the nipple, through which the usual holes are formed for the gas to pass into the tube, is dispensed with, and the upper end of the nipple is entirely open at D. In conjunction with the nipple is a thimble E connected to it—the lower end being connected to the gas-supply pipe. The invention consists principally in arranging in the interior of the thimble a disc F formed with a central hole G and with cut-out portions H connected with it; the portions of the disc corresponding with the cut-out portions being hollowed out or dished, to receive a hollow ball I made of light material, and provided with two or more holes J. The dishing of the disc is carried out to a larger radius than that of the ball, so that when the pressure of gas is very low, the ball rests on the disc over the central hole, but allows gas to escape through thin passages left between the ball and the outer edges of the cut-out portions. So long as the pressure of gas remains low, the ball rests upon the plate; but being light it can be lifted more or less, and be sustained by the gas in the lifted position so as to allow more gas to pass beyond the ball. The ball is therefore caused to revolve and "so break up the gas into small atoms," in which condition it takes up more air into the mixing-chamber of the bunsen burner proper, and so gives "a greater heating flame with less gas." On the other hand, if the pressure of the gas is high the ball is lifted towards the top of the conical chamber within the thimble, making joint with the sides or interior of the cone. At this time gas is only allowed to pass through the ball by means of the holes, whereby a more regular supply of gas is allowed to pass to the burner and a more even flame is produced. The upper end of the thimble is provided with discharge holes for the gas, and whether the ball be resting on the disc or be lifted by the pressure of the gas, the object is to cause diffusion of the latter throughout the conical chamber and a further breaking up of the gas prior to passing through the discharge holes.

Separating Solid Hydrocarbons from Naphtha Residues and Tars.

TANNE, J., of Galizia, Austria, and OBERLÄNDER, G., of Berlin.

No. 1687; Jan. 23, 1911.

This invention relates to a process for separating solid hydrocarbons —such as paraffin, ceresin, and ozokerite—from naphtha residue and tars, as described in patent No. 27,116 of 1909.

According to the present process, instead of the solution of glacial acetic acid in benzene, a solution of a fatty acid homologous with the acetic acid—such as propionic acid, butyric acid, or the like in benzene —is used as the separating agent, without the process being changed in any other way. The new separating agents are employed in the same manner as in the original process.

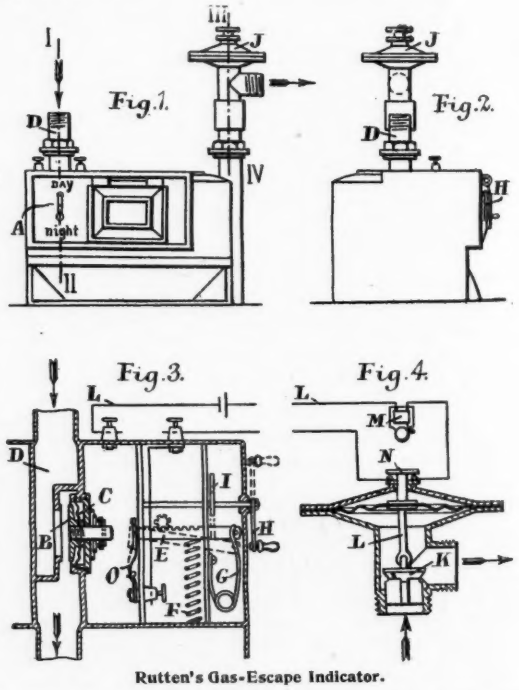
The present process is said to be "remarkable for the fact that the solid hydrocarbons will crystallize out better, and the product obtained be harder."

Automatic Control Valves for Gas Supply.

RUTTEN, J., of The Hague, Holland.

No. 2892; Feb. 4, 1911.

This invention consists in a method of "automatically controlling the closing of gas-valves, gas-pipes, and the like, wherein gas enters the meter through a first controlling device which admits predetermined or non-predetermined quantities of gas as desired and passes through a second controlling device to the service pipe, which second device is so designed that should a burner cock be left open, or a leakage occur in the service pipe, the supply of gas to the latter will be almost entirely shut off."



Rutten's Gas-Escape Indicator.

Fig. 1 is a front elevation, and fig. 2 a side elevation of one form of the apparatus fitted to a gas-meter. Fig. 3 is a vertical section on the line I.—II. of fig. 1; and fig. 4, a vertical section on the line III.—IV.

A is the first controlling device fitted on the upper part of the meter. It comprises a valve B fitted with a spring having a tendency to open the valve. In its normal (open) position, it allows gas to pass freely from the supply pipe into the gas-meter as indicated by the arrow; but when the valve is closed, no gas can enter the meter or service pipe, The valve is connected to a diaphragm C, which prevents the gas escaping from the pipe D past the valve-spindle.

Facing the back of the valve is the front end of a rack E capable of sliding towards the valve to close the latter by a pinion gearing with the rack, which is also capable of being moved transversely into, and out of operation with, the pinion; while a spring F has a tendency to move the rack into engagement with the pinion. A spring G tends to draw the rack back into the position shown in dotted lines in fig. 3; the valve B being then open by its own spring.

The operation of the apparatus is as follows: Normally the handle H for operating the cam I is placed in the "day position," in which the controlling device A is out of action as the pinion is disengaged from the rack E. The controlling device J, however, is permanently in operative position. Should therefore too much gas escape from the service pipe, the valve K will shut off the gas supply to the service pipe, and only a small quantity of gas can enter it through the groove (or bye-pass) of the valve L.

The controlling device makes it possible to shut off the gas supply to the service pipe by opening an ordinary big gas-cock, which is in connection with the atmosphere. On opening this cock, the pressure in the service pipe and under the diaphragm or bell diminishes to such an extent as to cause the second valve to shut off the gas supply. By this means the gas in the service pipe of a house can be shut off from any bedroom or other room. As soon as the big cock is closed and if no burner has been left open, the pressure in the service pipe increases and the second valve will open.

When the cam handle is placed in the "night position," the gas supply to the service pipe is maintained until the valve B is automatically closed. The quantity of gas flowing into the service pipe after the cam handle is thus placed is sufficient to keep a bedroom burner alight for a considerable time, but is not sufficient "to poison the atmosphere in the bedroom." The burner being extinguished before the valve is closed, the gas in the service pipe maintains the normal pressure causing the valve K to remain open. On replacing the cam handle H into the "day position," the rack E is disengaged from its pinion and is drawn backwards by the spring G. The valve thereupon opens again, and gas flows freely into the service pipe. The electric alarm M cannot be operated thereby, as the bridge piece N does not make contact with the terminals of the controlling device.

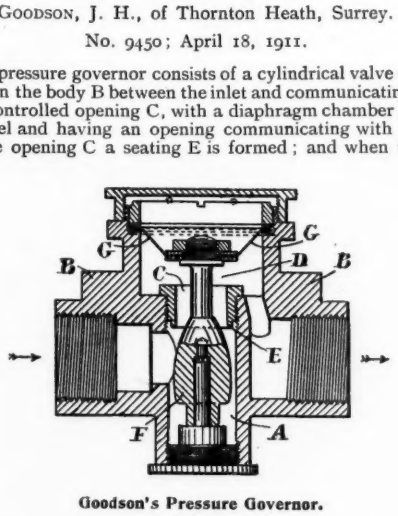
Should, however, a bedroom burner be left open after the valve has been closed by the rack, the pressure of the controlling device J and the service pipe falls; and, in consequence, the valve K will be closed. The bridge piece N then makes contact between the contact pieces, and then, when the cam handle H is placed into the "day position" (figs. 1 and 3), the rack will be drawn backwards by its spring, and the tongue O will make contact with its contact piece and the alarm M will be operated. The valve B is now open, but the valve K remains closed, as no pressure can be produced in the chamber or service pipe so long as the bedroom burner is open, since the small quantity of gas passing the valve escapes through the open burner. As soon as the bedroom burner, however, is closed, sufficient pressure will be produced in the chamber, and the valve K will open fully and the electric alarm circuit broken—gas passing freely into the service pipe.

Gas Pressure Governor.

GOODSON, J. H., of Thornton Heath, Surrey.

No. 9450; April 18, 1911.

This gas pressure governor consists of a cylindrical valve chamber A interposed in the body B between the inlet and communicating, through the valve controlled opening C, with a diaphragm chamber D provided on the barrel and having an opening communicating with the outlet. Around the opening C a seating E is formed; and when the conical



Goodson's Pressure Governor.

valve F is raised against this seating by the diaphragm G, the gas is shut off. The lower end of the valve chamber is closed by a screw plug carrying a fixed guide stem or pin which enters a cylindrical bore in the valve and serves to guide it vertically. The diaphragm chamber is closed by a removable cover provided with vent-holes.

In operation, gas on entering passes between the top of the valve and the seating E through the opening C into the diaphragm chamber D, raising the diaphragm more or less under the influence of the pressure from the main or back-pressure from the outlet pipe, and finally passing through the opening in the bottom of the diaphragm chamber to the outlet. The valve works quite freely in the chamber A, plenty of clearance being left around it.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Abolition of Sunday Labour in Gas-Works.

SIR,—I am sure your readers were, as I was, very pleased to see Mr. William King's reminder, in your current issue, that Sunday labour at the Liverpool Gas-Works was abolished by his late father as long ago as 1843. All honour to Mr. Alfred King, and to any others who may have done likewise.

I need hardly assure his son that there is not the least desire on my part to ignore anyone's memory in connection with this matter; but to my mind the most notable fact in relation to it is the one to which I endeavoured to direct attention the other evening—namely, that to Messrs. Livesey and Morton's initiative in 1871, and their subsequent crusade, we owe the present wide-spread recognition of this most humanizing and beneficial reform.

17, *Victoria Street, S.W., Aug.* 31, 1911. CHARLES HUNT.

Inquiry Circulars.

SIR,—I enclose copies of two circulars of inquiry received to-day, and may say that this makes a total of at least ten I have received from the same undertaking during the past three years.

You may make any use you think proper of the enclosed; but please suppress my name in connection therewith.

Aug. 30, 1911. ENGINEER.

[ENCLOSURE.]

Show-Rooms—Hire of Gas Apparatus.

DEAR SIR,—The question of utilizing vacant premises in the centre of the town as a combined show-room for the Gas and Electricity Departments (both under the same Committee) is under consideration here, together with the practicability or otherwise of having the Distribution Department's stores, workshops, and offices in the same block.

As I understand that you have a show-room in your town, I shall be very grateful for any information which you may care to give me on the matter.

Do you supply any gas apparatus besides gas cooking-stoves on hire or hire purchase? We have not done so here up to the present; but the matter is under consideration.

The enclosed list of inquiries may possibly save your time in answering my letter.

Apologising for troubling you, and assuring you that I shall be very pleased to reciprocate your kindness should an opportunity occur.—I am, &c.

Show-Rooms.

Do you exhibit gas-fittings and gas appliances generally, or only cooking and heating stoves?
Do you sell the fittings, or how can consumers obtain them?
Is your show-room some distance from the gas-works?
If so, have you any of the following in connection with it in the same block of buildings? Complaint and order office, stores for outdoor department, gas-fitters' workshops.
What class of man do you have in charge—clerk, gas-fitter, or shopman; and do you expect him to have much technical knowledge of the applications of gas?
How many men and boys do you have all day at the show-room?
Can you favour me with picture post-cards or similar views of your show-room?

Hire of Gas Apparatus.

About how many makers' gas appliances do you supply?
Do you supply on both simple hire and hire-purchase, and which do you find the more satisfactory?
Can you favour me with printed matter showing your terms and copies of your agreements, stating the amount of stamp duty required?

Gas-Workers' Wages at Huddersfield.—A deputation of workmen has waited on the Huddersfield Gas Committee with reference to a request of the employees for higher wages; both stokers and general labourers desiring an advance amounting to about 7½ per cent. It was explained on behalf of the men that the Corporation were not paying as high wages as other municipal gas undertakings, and that the cost of living in Huddersfield was more than in other towns of similar size. It is stated that the question was discussed in a friendly manner; and after the deputation had left, the Committee appointed a small Sub-Committee to go into the matter and report to an early meeting of the Committee. As the Council will not meet again until October, it was understood that the men would defer any action until after the matter has been submitted to the meeting of the Council that month.

Barnsley Gas Company.—At the annual meeting of the Barnsley Gas Company, Mr. E. G. Lancaster, in moving the adoption of the report and balance-sheet, said there was a surplus of £175, after paying the usual dividends. This was not unsatisfactory, considering they had allowed £644 in discount for the prompt payment of accounts—an amount equal to one-thirteenth of the sum paid in dividends. They had sold 3 million cubic feet more gas. The present time, however, was a rather difficult one. They had not been able to complete the work of fixing mechanical stokers. Cudworth, who had been a good customer, had decided to make their own gas, though the Company had offered to supply them for a term of years at 1½d. per 1000 cubic feet less than the actual cost price at the present time. Then the Barnsley Corporation were evidently going to introduce electricity for street lighting, as they had given notice for the discontinuance of the supply of gas for the public lamps. The Directors were going to increase the discounts to customers for prompt payment by another 2½ per cent., which would mean that the consumers would receive in discount one-sixth of the amount handed to shareholders. A resolution was adopted expressing appreciation of the fifty years' service of Mr. W. W. Hutchinson, Secretary and Manager of the Company, and regret at his retirement owing to ill-health.

MISCELLANEOUS NEWS.

GASLIGHT AND COKE COMPANY'S EMPLOYEES.

Higher Pay for Carbonizing Men.—Increased Holiday Allowances.

We understand that the Directors of the Gaslight and Coke Company have resolved to increase the pay of all classes of workmen regularly employed in the carbonizing department (both coal gas and oil gas) by 6d. per shift of eight hours.

When making this announcement at a meeting of representatives of the staff of carbonizing men which was held at Horseferry Road on Monday of last week, the Governor (Mr. Corbet Woodall) made a further interesting communication on the subject of workmen's holidays, which is set out in a notice subsequently posted at the Company's works. This was to the effect that the attention of the Governor and the Court of Directors has been recently given to numerous withdrawals of the "withdrawable" portion of the co-partnership bonus, which they understand have been mainly for the excellent purpose of contributing to the expenses of the annual holiday of the co-partners' families. The Directors are to the fullest extent in sympathy with this object; but, at the same time, they are anxious that individual co-partnership accounts, as well as the general co-partnership funds, shall not be weakened by withdrawals, except in cases which may be fairly considered as urgent. The Directors have resolved, in order to obviate the necessity of using the withdrawable account for holiday purposes, to anticipate in some measure their celebration of the Centenary of the Company, which will fall next year, and to forthwith increase the usual holiday allowance of their workmen at manufacturing stations to a fortnight's pay at the usual current rates—the period of the holiday (one week) remaining as hitherto. They trust that this will carry with it an honourable understanding that the money granted will be used for the purpose named. The additional holiday allowance will be made, subject to the usual conditions of good time-keeping, to all those manufacturing station workmen who, by the end of September in any year, will have completed three years' consecutive service. Those workmen who have already had their holidays, and whose length and regularity of service comply with the foregoing conditions, will therefore be paid an additional week's wages at once, while those whose holidays are still to come will receive two weeks' pay at the time of starting. The holiday allowance to workmen of less than three years' service will remain as heretofore; but the period of service which will entitle a man to a holiday will be calculated up to Sept. 30 in any year, and not, as heretofore, from the commencement of the holiday season.

This alteration in the pay of the carbonizing men, as well as in the holiday allowance of all workmen at the manufacturing stations, was received by the representatives present at the meeting with expressions of satisfaction and thanks.

STATISTICS RELATING TO GAS UNDERTAKINGS.

Returns under the Census of Production Act, 1906.

The ninth, and last, of the series of tables summarizing the preliminary results of the returns received by the Board of Trade under the Census of Production Act, 1906, was issued early last week. It relates chiefly to the building and contracting trades, quarries, and public utility services, including those of gas, water, and electricity supply. The tabulated statistics are preceded by a report by the Director of the Census (Mr. A. W. Flux); and this follows one addressed to the Secretary of the Board of Trade by the Comptroller-General of the Labour department (Mr. G. R. Askwith, C.B., K.C.).

In the course of his report, Mr. Askwith points out that the statistics are to undergo revision before they are submitted in their entirety, but he thinks they are sufficiently close to the final figures to afford a good indication of the quantity and value of the principal products of the industries to which they relate. Some idea of the work involved in the production of this series of Blue-books may be had when it is mentioned that to obtain the information embodied in the tables, about 144,000 schedules were issued to firms and companies engaged in the various industries, and also to public authorities. The returns are mainly for the year 1907, and they show that the average number of persons employed in the work covered by the tables was then about a million; and the total output of that year represented an addition of about £104,250,000 to the value of the materials purchased. The completion of the preliminary tables affords an opportunity of summarizing the principal figures, and showing their magnitude; and this is done in a table of which the following are the totals for the United Kingdom: Gross output, selling value, or value of work done, £1,757,000,000; cost of materials used, £1,019,000,000; amount paid to other firms for work given out, £26,000,000; net output, £712,000,000; average number of persons employed, excluding about 100,000 outworkers, 6,936,000. The average number of persons employed on the work covered by the census was thus about 7,000,000; and the total output in the censal year represented an addition of about £712,000,000 to the value of the materials purchased.

We give below the portion of the Blue-book just issued which deals with gas undertakings. As already mentioned, the returns are normally for the year 1907; but where the financial period of a firm, company, or authority was not a calendar year, permission was given to furnish particulars for twelve months ending not earlier than June 30, 1907, nor later than June 30, 1908. The returns for the gas undertakings of His Majesty's War Office are for the year ended March 31, 1908. Mr. Flux gives a table showing, for the United Kingdom as a whole, the gross output, the cost of material used, the net output, the number of persons employed, and the net output per person. It contains the following figures relating to gas undertakings:—

	Companies.	Public Authorities.
Gross output selling value, or value of work done	£20,838,000	£10,769,000
Cost of material used	9,292,000	5,037,000
Net output	£11,546,000	£5,732,000
Number of persons employed	54,946	28,585
Net output per person	£210	£201

The tables are based on returns received in respect of gas made by companies and by public authorities for sale and for public lighting. Returns were not required from collieries, factories, and other establishments possessing plant for the generation of gas for their own use, except in the case of railway companies. The returns received in respect of the gas-works at the Royal Arsenal, Woolwich, and the Royal Small Arms Factory, Enfield, are included with those received from local authorities in the tables relating to public authorities. Separate tables are given showing the particulars furnished in respect of the undertakings conducted by companies, and in regard to those conducted by public authorities. The following statement shows the particulars furnished as to the aggregate output of gas undertakings of both classes, and is free from duplication:—

	Quantity.	Value.
Coal gas and water gas	(a)	£23,157,000
Coke and breeze	7,590,000 tons	4,434,000
Crude tar	653,000 ,,	667,000
Ammoniacal liquor	(a)	322,000
Ammoniacal liquor and crude tar, not separately distinguished	(a)	179,000
Bye-products—		
Ammonia, sulphate of	105,000 ,,	1,078,000
Anthracene	296,000 lbs.	2,000
Benzol and toluol	46,000 galls.	2,000
Carbolic acid	18,000 ,, / 18,000 cwt.	25,000
Naphtha	281,000 galls.	8,000
Naphthalene	44,000 cwt.	12,000
Pitch	85,000 tons	110,000
Tar (refined) and tar varnishes	642,000 galls.	6,000
Tar oil, creosote, &c.	7,877,000 ,,	84,000
Other bye-products	(a)	166,000
Other products	(a)	33,000

(a) Recorded by value only.

The total value of the above-mentioned products amounts to £30,285,000, and is exclusive of the value of any gas and coke used in the gas-works where they were made. The crude tar and ammoniacal liquor included in the statement do not represent the total quantities made, but only the quantities not subjected to further treatment at the works where they were made. In addition, £1,322,000 was received from consumers for fixing stoves, fittings, &c., exclusive of the cost of the lighting, heating, or cooking apparatus fixed. The total output of gas undertakings was thus £31,607,000.

Under the limitations imposed by the Census of Production Act, it was not possible to require the quantity of gas made to be stated in the compulsory part of the schedule. A voluntary question was accordingly included in the schedule, requesting companies and public authorities to state the quantity of gas made by them. The great majority furnished this information. But some supplied particulars only of the gas sold; and companies and authorities that sold gas valued at £369,000 gave no particulars. After due allowance has been made for these deficiencies, it may be estimated that the total make of gas in the United Kingdom in the year of the return was as follows:

	Thousand Cubic Feet
Statutory undertakings—	
Companies	118,650,000
Local authorities	69,845,000
Total	188,495,000
Non-statutory undertakings—	
Companies	7,090,000
Public authorities	690,000
Total	7,780,000
Grand total	196,275,000

The annual Returns of Gas Undertakings cover only those operating under statutory powers, and relate, as do the returns made to the Census of Production Office generally, to the year 1907 in the case of companies and to the twelve months ended March 31, 1908, in the case of the local authorities. The output shown in these returns was 118,699,705,000 cubic feet in the case of companies, and 69,786,988,000 cubic feet in that of local authorities. The very small differences between these figures and those given above are due to the fact that in some cases the returns made to the Census Office were not for the periods covered by the annual returns. According to these, the quantity of gas sold by authorized undertakings was 172,889,147,000 cubic feet; and, on the assumption that the relation between gas sold and gas made is similar for statutory and non-statutory undertakings, the total quantity sold and consumed in the United Kingdom in the censal year would be about 180,000 million cubic feet—the difference between make and sales being accounted for by gas used in works and leakages from mains. In addition to the gas made at public gas undertakings, railway companies stated in their returns that they made for their own purposes 1,411,496,000 cubic feet of coal gas at the cost of £146,000, and 441,933,000 cubic feet of oil gas valued at £140,000.

With regard to the other products of the distillation of coal, information was also received from the owners of coke-works at mines and iron-works, from the owners of tar distillation and sulphate of ammonia works, and from sundry other factory occupiers.

Combining the particulars thus furnished with those contained in the preceding statement, the following table shows the quantities and

values of the several products returned to the Census Office as made in the United Kingdom in the censal year :—

	Quantity.	Value.
Coke and breeze	19,762,000 tons	£14,607,000
Crude tar	846,000 ,,	833,000
Ammoniacal liquor	(a)	361,000
Ammoniacal liquor and crude tar, not separately distinguished.	(a)	179,000
Ammonia, sulphate of	260,000 ,,	2,823,000
Anthracene	3,126,000 lbs.	9,000
Benzol and toluol	6,212,000 galls.	182,000
Carbolic acid	688,000 ,, / 160,000 cwt.	208,000
Naphtha	4,188,000 galls.	141,000
Naphthalene	283,000 cwt.	42,000
Pitch	647,000 tons	795,000
Tar (refined) and tar varnishes	6,251,000 galls.	64,000
Tar oil, creosote, &c.	65,613,000 ,,	672,000
Other coal tar bye-products (not dyes)	(a)	565,000

(a) Recorded by value only.

As indicated above the crude tar and ammonical liquor included in the foregoing statement only represent the quantities of these products which were sold or retained in stock as crude tar and ammoniacal liquor and not the total quantities made.

With regard to the output of sulphate of ammonia, the Chief Inspector of Alkali Works, in his forty-fifth annual report, estimated that in 1907 "the recovery and production of ammonia in the United Kingdom, expressed in terms of sulphate," was the equivalent of 313,000 tons of sulphate of ammonia—adding that these figures "do not represent the produce of sulphate of ammonia." His estimate of the theoretical produce of sulphate of ammonia showed 165,000 tons from gas-works and 148,000 tons from other works, as compared with actual quantities of 105,000 tons returned to the Census Office as produced at gas-works, and 155,000 tons as produced at other works. There is thus a difference of 53,000 tons between the actual and the theoretical quantities of sulphate of ammonia. With regard to this difference, two points have to be noted. First, it appears from the report quoted that in 1908 it was discovered that there had been certain errors in the method of calculating the quantities for previous years, and that consequently the theoretical total for 1907 is somewhat overestimated. Secondly, the principal difference between the two figures occurs in the produce of gas-works ; and in addition to the 105,000 tons of sulphate returned to the Census Office as produced at such works, there was also produced ammoniacal liquor valued at £322,000 (and, including liquor produced at other works, £361,000), and ammoniacal liquor and crude tar, not separately distinguished, valued at £179,000. This liquor is sold partly to alkali works for use in the production of alkali by the ammonia-soda process, and partly to other firms making ammonia, and carbonate, chloride, and other compounds of ammonia. Particulars as to large quantities of ammonia and ammonia compounds were returned to the Census Office ; but, in order to avoid the possibility of disclosing particulars relating to individual firms, they have not been shown separately, but are included in the group of "Unenumerated Chemicals" in the group of "Other Bye-Products," in the tabular statement already given. All such ammonia and ammonia compounds, as well as the liquor sold to alkali works, are included by the Chief Inspector of Alkali Works in his estimate of their equivalent in sulphate of ammonia. Further, some sulphate of ammonia was probably worked up by the makers into compound manures, and included as such in the returns made to the Census Office. Thus there appears to be no inconsistency between the figures of actual output of sulphate of ammonia as returned to the Census Office, and the estimate of the production of ammonia and ammonia compounds made by the Chief Inspector in terms of sulphate of ammonia.

The exports of coke in 1907 amounted to 981,000 tons, or 5 per cent. of the total output in the United Kingdom ; but the net imports (*i.e.*, the imports less re-exports) were only 18,000 tons. The exports of sulphate of ammonia amounted to 231,000 tons, or 89 per cent. of the total output ; the imports are not separately specified. The exports of carbolic acid amounted to 126,000 cwt., valued at £154,000, free on board ; those of anthracene and napthalene to 100,000 cwt., valued at £28,000, free on board ; and the exports of all other coal-tar products (not dyes) were valued at £1,064,000, free on board. The net imports of coal-tar products (not dyes) were valued at £87,000 at the port of landing.

The net output of all the gas undertakings covered by the report is £17,278,000 ; this sum representing the total amount by which the value of the output exceeded the cost of the materials used. The actual cost of materials was £14,329,000.

The average number of persons employed on the four dates for which the numbers were returned was 83,531—viz., 74,967 wage earners and 8564 salaried persons. Of the total number, 81,888 (including 8514 salaried persons) were employed at gas-works, and 1643 (including 50 salaried persons) at tar-distilling and ammonia works. The total number of persons ordinarily employed at gas-works, according to the Home Office return of persons employed in 1907 in non-textile factories, was 62,234. Gas fitters and chemical workers were separately distinguished—not being included in this total. Moreover, these figures refer to persons employed "wholly or partially in the factory," while the returns to the Census Office include members of the outdoor staff. But the whole of this staff (collectors, repairers, &c.), does not appear to have been included in some cases ; and allowance should be made for this fact in comparing the net output with the number employed.

Details as to Companies.

The next statement shows the particulars furnished by gas companies respecting the output of their works, and is free from duplication. The total value of the above products amounts to £19,889,000, and is exclusive of the value of any gas and coke used in the gas-works where they were made. As already noted, the crude tar and ammoniacal liquor included in the statement do not represent the total quantities made in companies' gas-works, but only the quantities not subjected to further treatment at the works where they were made. In addition, the sum of £949,000 was received from consumers for fixing stoves and other fittings, &c., exclusive of the cost of the lighting, heating, or cooking apparatus fixed. The total output of gas undertakings conducted by companies was thus £20,838,000.

	Quantity.	Value.
Coal gas and water gas	(a)	£15,324,000
Coke and breeze	4,706,000 tons	2,968,000
Crude tar	366,000 ,,	363,000
Ammoniacal liquor	(a)	140,000
Ammoniacal liquor and crude tar not separately distinguished.	(a)	18,000
Bye-products—		
Ammonia, sulphate of	73,000 tons	729,000
Anthracene	280,000 lbs.	2,000
Benzol and toluol	38,000 galls.	2,000
Carbolic acid	14,000 cwt.	21,000
Naphtha	57,000 galls.	3,000
Naphthalene	29,000 cwt.	11,000
Pitch	64,000 tons	88,000
Tar (refined) and tar varnishes	154,000 galls.	2,000
Tar oil, creosote, &c.	6,247,000 ,,	67,000
Other sorts	(a)	142,000
Other products	(a)	9,000

(a) Recorded by value only.

The working staff of gas companies is not employed solely in the operation of the gas-generating plant, but also in works of construction, alteration, and repair in connection with the buildings, plant, mains, &c. The cost of such work, whether immediately met out of capital or out of revenue, forms eventually a charge on the value of the gas and other products sold ; consequently, it has not been taken as an addition to the "output" of gas undertakings, in the sense in which this term has been used for the purposes of the census. A summary of the particulars furnished in respect of the cost of such work done in the censal year (covering wages, materials, and establishment charges attributable to the work) is shown below ; the work given out to contractors not being included :

	Construction.	Alteration and Repair.	Total.
Work done by employees of companies—			
Buildings and plant	£172,000	£1,307,000	£1,479,000
Street mains	324,000	378,000	702,000
Work not separately distinguished.	—	—	172,000
Total cost of work done			£2,353,000

The net output of gas undertakings conducted by companies was £11,546,000 ; this sum representing the total amount by which the value of the output of these undertakings exceeded the cost of the materials used. The actual cost of materials was £9,292,000.

The average number of persons employed on the last pay-days in January, April, July, and October, in connection with gas undertakings conducted by companies, was 54,946—viz. :

	Wage-Earners.	Salaried Persons.	Total.
At gas-works	48,253	5426	53,679
At tar-distilling and ammonia works.	1,232	35	1,267
Total	49,485	5461	54,946

The following statement affords some indication of the seasonal variation in the employment of wage-earners ; the figures showing the number of persons employed on last pay-days in the months named :

	January.	April.	July.	October.
At gas-works	51,705	46,838	45,340	49,129
At tar-distilling and ammonia works	1,281	1,258	1,157	1,229
Total	52,986	48,096	46,497	50,358

The total number returned was distributed by age and sex as follows : Males under 18, 1813 ; over 18, 52,909. Females under 18, 8 ; over 18, 216.

As already stated, it is probable that in some cases the whole of the outdoor staff of the companies (collectors, repairers, &c.) has not been included in these figures ; and allowance should be made for this in considering the net output per head.

Details as to Public Authorities.

The following statement shows the particulars furnished by public authorities respecting the output of their gas-works, and is free from duplication :—

	Quantity.	Value.
Coal gas and water gas	(a)	£7,833,000
Coke and breeze	2,884,000 tons	1,466,000
Crude tar	287,000 ,,	304,000
Ammoniacal liquor	(a)	182,000
Ammoniacal liquor and crude tar, not separately distinguished.	(a)	161,000
Bye-products—		
Ammonia, sulphate of	32,000 tons	349,000
Anthracene	16,000 lbs.	(b)
Benzol and toluol	8,000 galls.	(b)
Carbolic acid	18,000 ,, / 4,000 cwt.	4,000
Naphtha	224,000 galls.	5,000
Naphthalene	15,000 cwt.	1,000
Pitch	21,000 tons	22,000
Tar (refined) and tar varnishes	488,000 galls.	4,000
Tar oil, creosote, &c.	1,630,000 ,,	17,000
Other sorts.	(a)	24,000
Other products	(a)	24,000

The total value of the above-mentioned products amounts to £10,396,000, and is exclusive of the value of any gas and coke used in the gas-works where they were made. As already noted, the crude tar and ammoniacal liquor included in the statement do not represent the total quantities made in public authorities' gas-works, but only the

quantities not subjected to further treatment at the works where they were made. In addition, the sum of £373,000 was received from consumers for fixing stoves and other fittings, exclusive of the cost of the lighting, heating, or cooking apparatus fixed. The total output of the gas undertakings conducted by public authorities was thus £10,769,000.

As already explained in the case of companies, the working staff of the gas undertakings of public authorities is engaged not only in operating the generating plant, but also in works of construction, alteration, and repair in connection with the buildings, plant, mains, &c. The cost of such work has not been taken as part of the output of the undertakings; but a summary of the particulars furnished in respect of the cost of such work (covering wages, materials, and establishment charges attributable to the work) is given below; the work given out to contractors not being included:

	Construction.	Alteration and Repair.	Total.
Work done by employees of public authorities—			
Buildings and plant	£38,000	£610,000	£648,000
Street mains	164,000	227,000	391,000
Work not separately distinguished	—	—	142,000
Total cost of work done			£1,181,000

The net output of gas undertakings conducted by public authorities was £5,732,000; this sum representing the total amount by which the value of the output exceeded the cost of the materials used. The actual cost of materials was £5,037,000.

The average number of persons employed on the last pay-days in April (*c*), July, and October, 1907, and January, 1908, in connection with gas undertakings conducted by public authorities, is returned as 28,585—viz.:

	Wage-Earners.	Salaried Persons.	Total.
At gas-works	25,121	3,088	28,209
At tar-distilling and ammonia works	361	15	376
Total	25,482	3,103	28,585

The following statement affords some indication of the seasonal variation in the employment of wage-earners, the figures, as in the case of the companies, showing the number of persons employed on the last pay-days in the months named:

	April.	July.	October.	January.
At gas-works	23,734	23,171	25,779	27,801
At tar-distilling and ammonia works	346	282	407	410
Total	24,080	23,453	26,186	28,211

The total number returned was distributed by age and sex as follows: Males under 18, 557; over 18, 27,927. Females under 18, 3; over 18, 98.

As in the case of the companies, allowance has to be made for the whole of the outdoor staff (collectors, repairers, &c.) not being included in these figures.

The statistics given in the foregoing extracts will be found in much greater detail in the tables following the general report by the Director of the Census.

METROPOLITAN (OF MELBOURNE) GAS COMPANY.

The Half-Yearly Meeting.

This Meeting was held on Thursday, July 27—Mr. JOHN GRICE in the chair.

The balance-sheet and detailed financial statement showed that the net profits for the half year to June 30, including a balance of £2646 brought forward from the previous half year, amounted to £99,901. From this sum the Directors recommended the transferences of £25,000 to the reserve fund account; £5000 to the meter renewal fund; £20,000 to the works reconstruction account; and £2000 to the gas-stoves, &c., account. A dividend at the rate of 5s. a share (amounting to £42,860) was recommended; leaving £5040 to be carried forward.

The CHAIRMAN, in moving the adoption of the report and balance-sheet, said that the results of the six months' operations indicated continued prosperity in the community and a satisfactory response to the Company's sustained efforts to take advantage of conditions arising therefrom. Proceeding, he remarked: The number of meters standing fixed at June 30 and at the same date in 1910 shows considerable expansion, as follows:—

	1911.	1910.	Increase.
Ordinary	87,273	80,330	6,943
Slots	19,397	16,826	2,571
	106,670	97,156	9,514

The total sales of gas during the half year amounted to 998,193,000 cubic feet, compared with 881,468,000 cubic feet in the corresponding half of 1910—representing an increase of 13¼ per cent.; and though a part of this increase is attributable to the exceptionally cold and wet season we have experienced, much of it is doubtless in consequence of the more extended use and popularity of the gas-stove, which is in these times a practical necessity. The ever-increasing problem of domestic help, and the growing practice of adopting all possible labour-saving appliances, have made it so. I need not recapitulate the methods we employ to bring the advantages of cooking by gas before the public. I will content myself by assuring you that our efforts are unabated, and have not been fruitless, since we placed no fewer than 3718 new stove consumers on our books in the past six months—a very large number for that period of the year.

The effect of the continued activity in the building trade and the expansion of the various suburbs around Melbourne are reflected in our outgoings for new mains, services, and meters. Under these three headings, our accounts show a total expenditure of £25,969. New mains represent an extension to our reticulation service of 15,926 yards, or just over 9 miles.

Referring to the different items in the balance-sheet, I may point out that as the figures for the half year ended June 30, 1910, were very largely affected by the disturbing influences of the Newcastle strike during the early months of that year, a satisfactory comparison with the half year immediately past is not possible. As an example of this, the cost of coal carbonized in June, 1910, worked out for the half year at £88,048 for 94,711 tons, while during the corresponding period of this year the outlay amounted to the smaller sum of £80,057 for the larger quantity of 102,024 tons.

Together with other large employers of labour, we have met the demands for all-round increases in the rates of pay to employees; and the various items on the expenditure side of the balance-sheet, such as wages at works, repairs at works, expenses of distribution, which include the cost of labour, have expanded in an upward direction owing to this factor. The cost of manufacture and distribution and the handling of residuals, &c., has thus been increased by the large sum of £25,000 per annum, which is being paid to the employees of the Company in the form of increased rates of wages, &c., and which of course affects our yearly balance to this extent.

The receipts from sales of gas consumed by meter and for public lighting amounted to £240,450, and residuals realized £60,052.

The only transfer calling for remark is that to "works reconstruction account," £20,000. This appropriation appeared for the first time in the balance-sheet for the half year to December last, and an explanation for its inclusion was then given, as well as an intimation that similar provision would be necessary in the next few half years. The new Dessau vertical retort-house, which is an imperative requirement to meet the increased output of gas, is now in course of construction at West Melbourne; and that manufacturing station is being practically remodelled and largely reconstructed to ensure more economical and effective results. These transfers to works reconstruction account are to provide the funds for reconstruction, and a similar value of buildings and plant now being demolished, but which are to be erected in another form, in accordance with our plans.

Referring still to my forecast, made last January, of the probable financial requirements of the Company in the then near future, I would remind you that I explained that, in addition to the provisions necessary to be made from revenue account for reconstruction and renewals at the West and South Melbourne works, some capital would have to be forthcoming for new and additional plant and buildings about to be erected. As the time has arrived when the capital expenditure above alluded to has to be incurred, we have given notice that we intend to-day to ask the authority of shareholders to re-issue debentures to the sum of £59,000 towards the funds required for the work in hand. The amount in question is made up of separate lots, respectively of £9000 and £50,000 debentures, paid off during recent years, and allowed to remain unissued until the demands upon the Company's capital account rendered this course necessary.

My remarks at our last meeting were concluded by a short reference to the adoption after careful inquiry by the Society of Medical Officers of Health (London), of a system of gas lighting and heating for their offices and demonstration and exhibition rooms, which clearly showed that body considered gas a healthy illuminant. Since that date further valuable testimony has been adduced, which I do not think should remain unnoticed, concerning the results of scientific investigation into the hygienic conditions arising out of the use of gas for purposes of lighting and heating. On this occasion I refer to the results given in a recent issue of the "Medical Magazine" of an inquiry on this important subject, made under the supervision of the Medical Superintendent of the Lewisham (England) Infirmary, Dr. F. S. Toogood. After quoting the report (which appeared in the "JOURNAL" at the time of its issue), the Chairman concluded: I do not think in these days that the public is quite so ready to accept without proper inquiry the statements made by our competitors, that the use of gas for lighting and heating gives rise to unhealthy conditions; but in any case it is both interesting and instructive to learn the conclusions arrived at by modern scientific investigators who have applied themselves with an open mind to testing the truth or otherwise of such statements.

Mr. EDWIN PHILLIPS, in seconding the motion, said it might be thought that the Company were spending too much on machinery; but the present was an age of machinery—it never went out on strike, was always willing to work, and it was a great advantage.

The resolution was passed; as was also the following: That the Directors of the Metropolitan Gas Company be and are hereby authorized to borrow the sum of £59,000, for extensions and improvements to the Company's works at West Melbourne, and for that purpose to issue debentures to the said amount—such debentures to be charged and secured upon the undertaking, rates, and other revenues of the Company.

A resolution declaring the dividend concluded the business.

Limerick Gas-Works Extensions.—It has been decided by the Limerick Corporation to carry out a scheme of enlargement of the gas-works, at a cost of £3300.

Melton Mowbray Gas Company, Limited.—At the annual meeting of this Company on the 25th ult., the accounts presented showed that the balance of profit and loss amounted to £2099; being an advance of £57 as compared with the previous year. The usual dividend of 7½ per cent. was declared. There was an increased revenue from the sale of gas by slot-meters of £145; but the ordinary meter consumption was £43 lower. The sales of residual products were extremely good during the year; and the Directors hoped this account would go still higher, as coke was advancing in price. Altogether it was one of the most satisfactory year's working the Company had ever had. After expressions of satisfaction and votes of thanks to the Managing-Directors, the Manager (Mr. G. R. Casterton), the Secretary (Mr. G. Rose), and the staff generally, the meeting closed.

(*a*) Recorded by value only. (*b*) Under £500. (*c*) April, 1908, in the case of local authorities in Scotland.

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TICEHURST AND DISTRICT WATER AND GAS COMPANY.

The Past and the Present.

An Ordinary General Meeting of Shareholders of this Company was held last Wednesday afternoon, at the Institute of Chartered Accountants, Moorgate Place, E.C., to receive the Directors' report and statement of accounts covering the period from Oct. 23, 1909, to April 30, 1911. Some points from the report were given in last week's "JOURNAL" (p. 554). Mr. C. S. GLOVER, the Chairman of the Company, presided over a numerous gathering.

In moving the adoption of the report and accounts, the Chairman entered into a lengthy explanation of the past history and the present position of the Company. In the course of his remarks, he said that on the last occasion he had the pleasure of meeting the proprietors, it was not in the position of Chairman of the Company, but as a large shareholder. In December, 1909, he and his colleague Mr. W. H. Collier, who was also largely interested in the Company, were unanimously elected to the Board, instead of Mr. W. B. Martin and Dr. W. R. White, who were requested to resign. Since then, Mr. Alfred Evans had joined the Board, and represented a large number of cash share and debenture holders. He thought it would be agreed that the shareholders had cause for congratulation on the marked progress shown by the accounts, and the satisfactory position, under the circumstances the Directors had had to contend against. Proceeding to detail the facts elicited during the examination which had been made of the affairs of the undertaking, he said that it was found in the course of the investigation that both Mr. Martin and Dr. White, the late Directors, were only acting as nominees of the original promoter of the Company, Mr. E. O. Preston; and that Mr. Preston really controlled the Company, received the revenue, and paid what expenses he considered necessary. Having unloaded shares and debentures upon the public, it was to his interest to just keep the Company alive, and pay a little debenture interest to those whom he could get to take a further financial interest in the undertaking and in other flotations for which he was responsible, and about which those present had probably all read in the Press. In 1903, Mr. Preston promoted two Statuory Companies—one the Wadhurst, Ticehurst, and District Gaslight and Coke Company, and the other the Ticehurst and Robertsbridge Water Company. Under the original purchase agreements, Mr. Preston was to pay the costs of obtaining the two Acts of Parliament, and in the case of the Gas Company transfer the benefit of his rights in a gas-works at Wadhurst which he had obtained from a Mr. Whitty for £500 in shares, and a gas-works at Ticehurst which he had secured for a small consideration from a private concern. For this he was to receive £16,500—a preposterous figure, and one that allowed a large surplus for profits. In the case of the Water Company, he was to construct a pumping-station at Burwash, and lay certain mains (in addition to paying for the Act) for a consideration of £18,500—which, again, left a large margin for profit, particulars of which were not given in the prospectus. It would thus be seen that a sum of some £35,000 was paid by the shareholders to Preston in cash, shares, and debentures. The shares and debentures transferred to him he disposed of through his share-pushing agency. He controlled the affairs until December, 1904, when the two Companies were amalgamated by a further Act of Parliament, and continued from Jan. 1, 1905, as the Ticehurst and District Water and Gas Company. The concern not having been a success, and being in want of funds, Preston sought the aid of Mr. Edmund Eaton—well known, unfortunately, he thought, among them all; and the Company was transferred to the notorious No. 99, Cannon Street address, and nominees of Eaton appointed as Directors in place of those of Preston. The capital of the Company having been increased by £10,000 in preference shares, the first thing that Eaton attempted was the issuing of a prospectus inviting subscriptions for these shares. In addition, Eaton and his nominee Directors sought to make further profits from the Ticehurst Company by giving, for no consideration, to themselves as controllers and directors of the Gas and Water Works Supplies and Construction Company, Limited, certain parts of its statutory area and rights in the form of two agreements to take water from the Company at the ridiculous figure of 6d. per 1000 gallons. Having obtained these agreements, Eaton, White, and Co. immediately formed the East Sussex Gaslight and Coke and Water Company, Limited, and the Robertsbridge, Salehurst, and Hurst Green Water and Gas Company, Limited, and sold the benefit under the agreements for enormous purchase considerations. Messrs. Eaton and Co. acted on the Boards of these Companies; and as soon as the water-mains were laid, the Ticehurst Company had to supply water under the agreements, every 1000 gallons of which resulted in a loss to the Company. Yet no steps were taken to remedy this state of affairs until the present Board took office, when, under the advice of Counsel, proceedings were begun to have the agreements annulled, and heavy damages were claimed against those responsible. The action against the Robertsbridge Company was settled on terms whereby the Ticehurst Company obtained their statutory area and the water-mains for a very small payment. As regarded the East Sussex Company, the action went to trial, with the result that in future the water supply must be paid for by that Company at the rate of 1s. 6d. per 1000 gallons, instead of 6d. In addition, judgment for damages and costs was given against Eaton and White. In the course of the investigations of the present Board, it was found that the bill of costs for obtaining the Water Act had been paid, with other costs, by the then Directors. Proceedings were therefore commenced against Preston to obtain the return of over £800. As a defence, he lodged a counter-claim for some £2000, which he stated that he had lent to the Company. They also claimed from him a large sum of money for various things which they contended he was liable for. Unfortunately, these proceedings were abortive, as a receiving order in bankruptcy had been made against Preston. The Directors had lodged a claim for some £18,000 against the estate. The Directors found that debentures had been created and issued by Eaton and Co. over and above the authorized number allowed by the Act. To preserve the goodwill and assets, a Receiver and Manager of the Company was appointed. It was found that the liabilities of the Company were enormous; there being large bills outstanding for coals and goods supplied. In many instances, coal had been purchased locally in small quantities at high prices, instead of being obtained by contract on favourable terms. There were complaints about the gas supply; in fact, the works were in a state of collapse. To remedy this state of affairs, and ensure a good supply of gas, and to connect up people who were wanting water, the Receiver obtained sanction to borrow £1500. With this sum, the work detailed in the report had been carried out. A large number of water agreements had been effected, whereby the consumers agreed to lay the mains and the Company to furnish water. When the Company had worked-off the cost of the mains by water supplied, the mains became the property of the Company together with the revenue, which alone should provide a further £200 to £300 per annum. Since the present Directors took office, they had added 85 water consumers and laid mains to connect up others; and it would be appreciated that this department was the most remunerative, as the expenses were not heavy. They had also added 35 gas consumers. Satisfactory arrangements had just been completed to supply gas to the Wadhurst Parish Council by meter, which should result in an increase of revenue over the previous arrangement; while the Company would also save the expense of lighting, cleaning, and extinguishing the lamps. Many more prospective gas and water consumers were waiting to be connected up. In consequence of the efforts made, a previous loss of £600 or £700 a year had been turned into a gross profit for the period under review of over £1000, with a net profit of £854. In addition, the works had been thoroughly overhauled and repaired, and many additions made, and the value of the goodwill and property accordingly enhanced. The Directors and officers took over the management of the concern determined, as far as they could, to place the Company in a satisfactory position. It was the present intention to pay 3 per cent. as a half-year's interest on such debentures as were properly issued; but they aimed at placing the concern in such a condition that they might be able to declare a dividend on the shares.

Innumerable questions having been replied to, the report was adopted. Acknowledgment was made of the great services rendered to the Company by the Solicitor (Mr. Jarvis), the Receiver and Manager (Mr. C. R. Beeby), the Managing-Director (Mr. A. W. Lunt), and the Secretary (Mr. T. W. Carter).

BARNET DISTRICT GAS AND WATER COMPANY.

Increased Make of Gas per Ton.—Unrestricted Supply of Water.

The Half-Yearly Meeting of this Company was held last Tuesday, at the Holborn Restaurant, W.C.—Mr. ALFRED H. BAYNES, J.P., in the chair.

The SECRETARY (Mr. Ernest W. Drew, F.C.A.) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

The CHAIRMAN said his first words that day must be expressive of deep and sincere grief at the sudden death of their highly esteemed colleague on the Board, Mr. Frederick Lennard, who passed away on the evening of Monday, Aug. 21. Mr. Lennard always took very special interest in the Company, to which he rendered most valuable service. For 28 years, he was an Auditor of the Company. Gifted with sound judgment, together with a wide experience of business, he was able to take a really active part in the deliberations of his fellow Directors. The Board felt sure that the shareholders would desire to join with them in sending to Mrs. Lennard and the sorrow-stricken family a respectful assurance of deep and sincere sympathy with them in their bereavement; and a communication would be sent to Mrs. Lennard in the joint names of the Directors and the proprietors.

Those present signified their agreement with this suggestion by rising silently in their places.

The CHAIRMAN then proceeded to move the adoption of the report and accounts; and in doing so, he dealt with some of the more prominent results obtained in the working for the six months to June 30. Referring first to the gas department of the undertaking, he said that the total expenditure in the half year on gas capital account had been £949; and this sum had been spent entirely on new mains, services, and meters. As to the revenue account, the increase in the receipts from the sale of gas for private and public lighting had been £268; and having regard to the fact that during the whole of the past half year the price had been 2d. per 1000 cubic feet less than it was in the corresponding period of the previous year, this increase might be looked upon as highly satisfactory—the sales having gone up by $4\frac{3}{4}$ million cubic feet, or 6·58 per cent. The receipts from meters and stoves were £86 more; this being due to the added consumers, which at the end of the half year numbered 5797. The returns from residuals showed an increase of £372; the total receipts being equivalent to 69·3 per cent. of the cost of the coal. The gas revenue account income exhibited a total increase of £728. With regard to the expenditure side of the account, the charge for manufacture was £8870, which was an increase of £394; this being due principally to the additional quantity of coal carbonized. The carbonizing result was extremely satisfactory; the gas made having been 13,041 cubic feet per ton, as against 12,558 cubic feet the previous year. The distribution charges were £2911, or £556 less than in the corresponding half year. This was due to the decreased amount which it had been necessary to spend on renewing mains and services. The total expenditure was £14,366; and the balance carried to net revenue was £4439—an increase of £780 over the same half of the previous year, though, as he had already mentioned, the price of gas had been reduced 2d. per 1000 cubic feet throughout the six months. He would point out that every attention was being given to consumers. During the last half year, the Company had cleaned free of charge for labour over 10,500 burners; and the fittings sold from the show-room exhibited a satisfactory increase. The number of new services laid was 251, though very few new houses were being erected in the Company's gas district. He had just one other comment to make on this side of the business, and that was with reference to the excessive amount which the Company paid

for rates. In the past half year it had been £933, or 3d. per 1000 cubic feet of gas sold. This was nearly the highest sum paid by any company, and was about 73 per cent. more than was paid by neighbouring companies; and it militated greatly against the fulfilment of the desire of the Board to supply gas at a lower price.

Turning to the water department, it would be seen that the expenditure on the water capital account during the past half year had been £14,339, of which £12,517 had been in connection with the new works at Tyttenhanger, and £1822 for new mains and meters. It was pleasing to be able to point to an increase of £1047 in the revenue. This was due principally to the larger number of consumers in the Company's water area; 315 new services having been connected during the half year. Before dealing with the expenditure side of the revenue account, he would refer to the extraordinarily dry and hot weather that had characterized the past half year. It had resulted in an abnormal demand for water—far greater than the Company had ever before experienced. They had, however, as a result of the new works at Tyttenhanger, and of other arrangements made, been able to meet all demands for water; and he thought they could congratulate themselves and their consumers on the fact that they had been in a position to give a full and unrestricted supply. It was certainly a vindication of the policy of the Board in connection with the heavy outlay incurred to obtain water. This great demand, however, had resulted in the cost of maintenance, and particularly pumping and engine charges, being considerably increased; the total maintenance charges being £1425 more than in the corresponding half of the preceding year. He would like just to refer to a communication their Engineer (Mr. F. J. Bancroft) had received with regard to the great drought. It was from one of the consumers, and was in the following terms: "The great drought we hope is over; and I would like to send these few lines to gratefully acknowledge the splendid service of water that has daily filled our tanks and saved us from the slightest inconvenience during this very trying summer." He thought it most gratifying to receive such testimony from a consumer. The increase in rates and taxes amounted to £267; the amount paid during the past half year having been £2111, or over 10 per cent. of the gross receipts. Surely, the rating authorities of the district hardly realized that they had come to the point when it would be necessary for the Directors to take a decided stand against the continual increase in the assessments, and that they would, at great expense both to them and to the Company, be compelled to appeal against what had become a great injustice. Under the heading of management, there was a decreased charge of £331, due to a reduction in the item of law charges—the other items showing a slight increase. It would be seen that the total expenditure on water revenue account had been £10,191, which was an increase of £1093. But as the income was £1047 more than in the corresponding half year, the amount carried to net revenue showed only a slight decrease of £46.

The profit on fittings had amounted to £145; and this, together with the credit balances from the gas and water revenue accounts, enabled £14,840 to be carried to net revenue account. The charges for income-tax and interest showed an increase of £157; a sum of £1000 had been transferred to the contingency fund; and after providing for the same rates of dividend as were declared for the previous half year, the balance to be carried forward was £19,529, which was a slight increase on the balance brought forward at the commencement of the six months just closed. It was only right to mention that the past half year had been a time of special anxiety and responsibility for their able Engineer—particularly in connection with the new source of supply at Tyttenhanger, and the long drought. As mentioned in the report, by means of temporary plant sufficient water had been obtained from Tyttenhanger to maintain a full supply to meet all the increasing demands of the growing district. The Directors felt sure that the proprietors would join with them in recording their high appreciation of the valuable services rendered by the Engineer and the members of his efficient staff.

Mr. J. L. CHAPMAN, in seconding the motion, remarked that the report and accounts were excellent in every way, and reflected great credit on those who had managed the affairs of the Company.

The resolution was at once carried unanimously.

On the proposition of the CHAIRMAN, seconded by Mr. CHAPMAN, dividends were thereafter declared, less income-tax, for the half year, at the rates per annum of 8 per cent. on the "A" and "C" stocks, 7 per cent. on the "B" stock, and £5 12s. per cent. on the "D" capital gas and water stocks.

Mr. A. F. PHILLIPS said it afforded him much pleasure to propose a vote of thanks to the Secretary, the Engineer, the Rental Clerk, and all the other officers of the Company, who had during the past half year rendered such able and such loyal service. In Mr. Drew, they possessed a most capable Secretary; and in Mr. Wright they had a Rental Clerk to whose energy they owed much. But what was he to say about Mr. Bancroft? He could only assure the shareholders that the last six months their Engineer had passed through a most trying time. The Directors realized that it was practically impossible to afford a proper supply of water through their district unless they obtained it from another source. The Metropolitan Water Board told them that they could give no further assistance. The unfortunate action taken to get an injunction to prevent the Company utilizing the site at Tyttenhanger delayed the completion of these works for two years. Immediately, however, the House of Lords gave their decision, and confirmed the Company in their rights, Mr. Bancroft set to work with an energy for which he deserved the very highest credit. He left no stone unturned, and never wasted a single hour until he had completed his plans and got the pumping-station at Tyttenhanger at work; and fortunately he was able to do this by the end of June. Now, had they not had this pumping-station to supply the district during the month of July and the present month [August], they would have been short of water, and a large number of their customers—especially those living on the higher levels about Finchley—would have been much inconvenienced. Consequently, it was not only the shareholders in the Company, but the public also, who were deeply indebted to Mr. Bancroft for the energy he had displayed and the way in which he had saved the situation. He (Mr. Phillips) had twice recently visited the pumping-station; and he could bear testimony to the excellent manner in which the work had been carried out. Not only was it most efficient in working, but its cost had been very economical. The Company had there a plant which was capable of adding to their water supply some 2 million gallons a day.

The resolution was seconded by Mr. ALFRED LASS, and carried unanimously.

Mr. DREW, Mr. BANCROFT, and Mr. WRIGHT returned thanks. Mr. Bancroft added that they had had two very trying years. Last year their difficulties were of a legal character, and delayed operations greatly; but directly this obstacle was overcome, they lost no time in getting on with the work. He could not possibly have secured the results that had been obtained in the gas department, or have been able to complete the Tyttenhanger works in time for the present summer, without very loyal assistance from the staff at Barnet.

The proceedings terminated with a vote of thanks to the Chairman and Directors, on the proposition of Mr. C. P. CROOKENDEN, seconded by Mr. WILLING TIBBS. The former gentleman remarked that it was most satisfactory to find the water supply had been maintained without any cessation whatever. The figures both in regard to gas and water were excellent.

SOUTHEND GAS COMPANY.

Continued Development of the Supply.

The Half-Yearly Meeting of the Southend Gas Company was held last Tuesday—Mr. C. F. WOOSNAM (the Chairman) presiding.

The SECRETARY (Mr. J. T. Randall) having read the notice convening the meeting, the report of the Directors for the six months ended the 30th of June was presented. It was stated therein that, as compared with the corresponding period of last year, 9·11 per cent. more gas had been sold. The number of consumers was 14,428, of which number 9809 were on the prepayment system. There were in the district 9899 cooking-stoves and 598 fires. The balance available for distribution was £10,504; and the Directors recommended the payment of dividends on the original and new ordinary stocks at the rate of 5⅝ per cent. per annum, and on the new ordinary "B" stock at the rate of 5½ per cent. per annum (all less income-tax). This would absorb £7466; leaving £3038 to be carried forward.

The CHAIRMAN, in moving the adoption of the report, referred to the increase in the consumption of gas. He said extensions of mains were still going on; the usual 1¼ miles having been laid in the past half year. Turning to the accounts, the revenue account showed that the Company had sold 15 million cubic feet more gas; making 176 millions, equal to £29,765, against £28,166 last year, or £1600 more. This figure would have been half as much again but for the reduction in price. The rentals of cooking-stoves, meters, and stove fittings showed an improvement of £300. Residual products were excellent, and were bringing in a sum of £5657—an increase of £1234. This was very largely due to the improved methods of carbonizing. The Company now turned out larger quantities of coke of the finest quality, for which there had been a very ready sale. The total receipts were £42,092. Deducting the expenditure of £33,000, there was a balance of £9092. This was not quite sufficient to pay the dividend without drawing to a small extent on the undivided balance.

The DEPUTY-CHAIRMAN (Mr. James Randall), in seconding the motion, referred to the increase in the amount received for fires and fittings—viz., £300 in the half year. He said this was very favourable indeed, because when they reduced the price of gas, they anticipated a profit from the use of the different appliances in regard to supply, and the sale of these appliances; and he looked forward to the no distant time when this branch would prove very beneficial.

Mr. J. TYSOE said the Directors were to be congratulated on the successful result of the half-year's working. The increase in the percentage of gas sold was a very important matter. They had the same result pretty generally throughout the country, though their friends who supported the electric light were fond of pointing out that gas was dying out. It was not so, however. It was holding its own, and would continue to do so for many years. Referring to the accounts, he said he noticed that coke had yielded an excellent return; but he thought the make of tar and liquor should be improved. He did not know what difficulties the Engineer (Mr. F. Clark) had to contend with; but he considered that the production for the half year was somewhat small.

The CHAIRMAN remarked that they were very glad to see Mr. Tysoe at the meeting, because he held a high position in the gas industry. With regard to his comment, the Directors knew that the make of tar and liquor was low; and personally he would like to see Mr. Tysoe have a chat with Mr. Clark to see if anything could be done to improve the position. He had been told, however, that they squeezed such a lot out of a ton of coal in the shape of coke, that they could not expect to get so much tar; and at present they were working at very high heats.

The motion was then put and carried unanimously.

Mr. J. H. BURROWS moved the payment of dividends as set forth in the Directors' report.

Mr. A. TALBOT, in seconding the motion, gave a series of interesting figures to show how the gas undertaking had developed in the town in spite of the introduction of the electric light, and said the demand for gas was increasing rapidly in the percentage both of consumers and population. In 1901, the population was 28,793 and the consumers numbered 4226, or 14·7 per cent., with no electric light opposition. In 1908, the population was estimated at 56,834, and the consumers numbered 11,700, or 20 per cent.; while this year the figures were 62,763 and 14,428 respectively, or 23 per cent. In 1901, the quantity of gas sold was 149,671,000 cubic feet; and in 1911, 371,857,000 cubic feet—an increase over 1901 of no less than 222,186,000 cubic feet. He thought they could look forward to a successful future.

The motion was carried.

A vote of thanks to the Chairman and staff having been passed,

Mr. CLARK, replying for the staff, alluded to Mr. Tysoe's comment in regard to the quantity of liquor produced, and said if that gentleman would take out the weight per ton he would see the Company were not far behind.

EASTBOURNE GAS COMPANY.

The Half-Yearly Meeting of this Company was held on Monday last week—Dr. G. A. JEFFERY, J.P. (the Chairman) presiding.

The SECRETARY (Mr. J. S. Garrard) having read the notice convening the meeting, the report and accounts for the six months ended the 30th of June were presented. The revenue account showed a profit of £9904; and there was a balance of £17,377 at the credit of profit and loss account, after payment of the half-yearly dividend in February and other charges. The Directors therefore recommended that a dividend for the past six months should be declared at the rate of 7½ per cent. per annum upon the "A" stock, of 6¼ per cent. per annum upon the "B" stock, and of 5 per cent. per annum upon the preference stock. These payments would absorb £8785, and leave a balance of £8592 to be carried forward.

The CHAIRMAN, in moving the adoption of the report, said the story he had to tell would be a short, but he hoped a pleasant, one. How had the Company reached the prosperity shown in the report? Every first-class business had something to sell; and the Company's was one of this class. They had to sell gaslight, which was a brilliant light, but one less trying to the eyes than any other artificial light. It was reliable and cheap, and was to a great extent superseding coal for heating and motive power. When compressed, and used with an incandescent mantle, it was the most brilliant light of the day. If he might coin a term, it was "the ratepayer's light." During the past half year, the Company had made 249 million cubic feet of gas—an increase of more than 7 million cubic feet compared with the first half of last year. This, he thought, spoke volumes. The consumers at the present time numbered no less than 10,202—a gain of 468 during the half year. The number of public lamps was 1525, and of stoves on hire 7573. With regard to the residual products, they had realized from them no less than £9710, against £7875—a gain of £1835. If the proprietors deducted the sum required to pay the dividend (£8785), and looked at what the residuals produced, they would find a surplus of £925. He would not weary them with further figures, but simply say that all along the line they had been successful, with one exception, and that was sulphate of ammonia, from which they had not received what they expected. When, however, the new plant which the Directors had that day decided to put up was built, they hoped to have a better return. The success of the past half year had been due largely to the indefatigable work of their Engineer (Mr. John Hammond), the Secretary, and staff—managers and men. Then there were his colleagues on the Board. He desired to convey to all a hearty expression of his thanks; and he was quite sure all present would, as shareholders, cordially endorse it.

Mr. A. W. OKE, in seconding the motion, remarked that when the public found doctors "coming round," and admitting that gas was the best and the most healthy light—the best for the eyes and also from the point of view of the ventilation of rooms used for large public assemblies—he thought they might say they had all they required. It only remained for them to go on using the wonderful burners and the economical stoves now on the market to an even greater extent than hitherto. With gas at 2s. 6d. and a population of 52,000 in the county borough, it was very refreshing to find that there were no less than 10,202 consumers in Eastbourne. He considered this spoke well, not only for the policy of the Board, but for the very capable management under which the Company had been working for years past.

The report was adopted, and the dividends recommended were declared.

The retiring Directors and Auditor having been re-elected, a proposal was submitted to increase the Directors' remuneration by £200—to £1200 per annum.

The CHAIRMAN, however, expressed a wish that the figure should remain £1000, free of income-tax, in accordance with a resolution on the *agenda;* and this was agreed to.

A vote of thanks was then accorded to the Directors, officers, and workmen, for the care with which they had conducted the affairs of the Company, as shown in the accounts, and also by the growth and progress made.

The CHAIRMAN having acknowledged the vote,

Mr. H. E. JONES (the Company's Consulting Engineer), responding on behalf of the staff, said he did not work so hard as the officials on the spot, who were heartily deserving of the thanks accorded them. The Company had a very far-seeing, liberal-minded, and broad-minded Board of Directors; and the work of the clerical department was done in a marvellous manner. The results of the past half year were better than they had been for some time. There was, however, room for improvement, and good ground to expect it.

A vote of thanks was passed to the Chairman for presiding; and with his acknowledgment the proceedings closed.

HARTLEPOOL GAS AND WATER COMPANY.

The Annual Meeting of this Company was held last Thursday—Mr. O. K. TRECHMANN (the Chairman) presiding.

The SECRETARY (Mr. W. Scott) having read the notice convening the meeting, the report of the Directors, with the accounts for the year ended the 30th of June, was presented. It was stated therein that the total revenue was £88,945, and the expenditure (including interest on loans, &c.) £57,060; leaving a balance of £31,885. An interim dividend was paid in March, and the Directors recommended the declaration of a like dividend for the past half year at the rate of 5 per cent. per annum, less income-tax.

The CHAIRMAN, in moving the adoption of the report, congratulated the Directors and shareholders alike upon the satisfactory results of the year's operations. There was a profit of £31,845, which enabled the Directors to recommend the payment of the maximum dividend of 5 per cent. The trade of the district, which had for so long been in a stagnant condition, had, he was glad to say, much improved. Most of the local industries were in full work; and the amount of wages now distributed very much increased the spending capacity of the artisan classes—which, in turn, benefited the town generally. What was really wanted in the town, however, was more industrial concerns, and, if possible, a greater variety of them, so that they might not be dependent upon shipbuilding alone. The Company's works, both gas and water, had been maintained in a satisfactory condition. It was most gratifying to be able to report that, notwithstanding the recent hot weather and the almost unprecedented drought, there had been an abundant supply of water for both domestic and commercial purposes—even much in excess of all demands. The present outlook in the coal trade was anything but bright; and should the North Country miners be successful in their call for a national strike on the eight hours question, the consequences would be most disastrous and far-reaching, and might lead to famine prices, not only for coal but most other commodities. Even if a strike were averted, the cost of working coal, which had been increased by the passing of the Mines (Eight Hours) Bill, would remain as a cause of permanent increased charge. If, further, they took into consideration the additional charges that all employers of labour would be called upon to pay on the passing of the State Insurance Bill, it would seem that in the near future their obligations and their costs would be considerably increased. Dealing with the revenue account, the Chairman said all the markets for residual products improved during last year, and were at present in a healthy state. Coke realized £600 more; the increase being largely due to the great demand for shipment. Sulphate of ammonia, which had accounted for an additional income of £668, had been in a most buoyant condition; the average selling price having been nearly £2 per ton above last year's prices, and higher than it had been for many years. This was to a great extent due to an increased demand from Japan, Java, and America; and, as far as it was possible to judge, there should be equally good results from next year's operations. Tar, which yielded an increase of £261, still maintained its value, and appeared likely to do so. Then, if the Road Board, as well as the various local authorities having control of the highways throughout the country, fully realized its value, and continued to extend its use as a dust preventer, it should become of still greater value, even if it did not reach the higher prices of former times. The general outlook on the whole of the residual products markets was decidedly bright; and he ventured to predict for the coming year prices as good as those obtained over the period under review. The Chairman next dealt with the subject of the competition of electricity with gas, and caused some laughter by referring to statements contained in a pamphlet he had received from the Borough Electrical Engineer, drawing attention to the alleged dangers of gas as an illuminant. Singularly enough, however, shortly after receiving the pamphlet, he had from Mr. Bower (the Engineer) a reprint of an article from the "Medical Magazine," giving an account of some experiments made last November at the Lewisham Infirmary.* Having given some particulars of the tests, the Chairman pointed out that the experiments were made by a medical authority, and not at the instigation of any gas company. The conclusion, he drew from them was that, both for lighting and heating, gas was, from a hygienic point of view, better than any other system.

The DEPUTY-CHAIRMAN (Mr. Robertson Murray, J.P.) seconded the motion; and it was carried unanimously.

The retiring Director and Auditor were re-elected; and the salary of the Secretary was increased by £100 per annum, from July, 1910.

A vote of thanks was accorded to the Chairman for his services; the mover of the resolution expressing the thanks of the shareholders to the officials, who, he said, had worked so loyally in the interests of the Company.

ROCHDALE CORPORATION GAS UNDERTAKING.

Thirty Years' Progress.

Reference has already been made in the "JOURNAL" to the fact that Mr. T. Banbury Ball, the Gas Engineer of the Rochdale Corporation, has completed thirty years' service. He took up his duties in 1881, in succession to Mr. William Romans; and since his appointment the progress of the undertaking has been remarkable. This is shown by some figures recently given in the "Rochdale Observer." At the end of March, 1881, the amount of capital employed was £164,956, or at the rate of £620 per million cubic feet of gas produced; whereas at the corresponding date this year it was £225,256, or at the rate of £360 per million. Details of the general progress can be best shown in tabular form as follows:—

	Year 1880-1.		Year 1910-11.
Gas made	265,736,000 c. ft.	..	625,320,000 c. ft.
Gas sold	235,148,000 ,,	..	582,232,200 ,,
Value of gas sold . . .	£44,319 5s. 3d.	..	£64,624 12s. 3d.
Value of residual products sold	£6,091 13s. 7d.	..	£25,292 18s. 8d.
Number of meters in use	19,210	..	32,030

The price of gas in 1881 was 3s. 8d. per 1000 cubic feet within the borough, and 4s. 4d. outside. In 1911, the figures are 2s. 8d. within and 2s. 11d. outside the borough.

In the course of an interview with a representative of the above-named paper, Mr. Ball furnished the following particulars in regard to the principal developments which have taken place at the gas-works during his occupancy of the engineership. When he went to Rochdale, only horizontal retorts were used, and a scheme of extensions, involving an outlay of £65,000, and including the erection of inclined retorts, was approved. An additional gasholder, with a capacity of 2¼ million cubic feet, was constructed. The next development was the installation of plant for the production of water gas; Rochdale being among the early authorities to adopt this system. The plant, together with the buildings, cost about £15,000; and the money was taken from the gas-works reserve fund. The latest development has been the installation of vertical retorts, which are now nearly ready for use. In connection with these extensions, manual labour in the handling of coal has been practically superseded. In 1881, nearly all the gas produced was used for

* See "JOURNAL," Vol. CXIII., p. 512.

lighting purposes; now about 30 per cent. is otherwise employed. Coming to the financial position of the undertaking, the figures presented show that in the past thirty years the net profits have reached the large total of £326,741.

At a meeting of the Gas Committee last Wednesday, on reference being made to the fact that Mr. T. Banbury Ball had completed 30 years' service with the undertaking, several members spoke in terms of high praise of the valuable services rendered by that gentleman to the town and the Corporation, as Manager of the Gas Department. A resolution was unanimously passed expressing the Gas Committee's appreciation of his services to the Corporation, and the hope that he would long be spared to hold the position he has filled with such success for so many years. Mr. Ball, in responding, referred to the good feeling which had always existed between the Gas Committee and himself.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

Coming Sale of Property in Vienna.

[From the "Financial Times," Sept. 2.]

A matter of great interest to the shareholders of the Imperial Continental Gas Association is the forthcoming sale of the Company's building site and house property in Vienna. As readers will remember from our previous notes on this subject, the concession of this important British Gas Company for lighting the old suburbs of Vienna, now absorbed into the city, expires on the 1st of January next, from which date the municipal gas-works will conduct the supply; the mains, gas-pipes, and street-lamps hitherto used by the Company becoming municipal property. The Company is left with its gas-works on its hands (the Municipality having meanwhile constructed gas-works of its own), and also with a certain quantity of adjoining land, as well as other property. We now see from the "Neue Freie Presse" that the Company intends to divide the land into building lots, and dispose of it to builders. The Company owns land besides at Baumgarten, Döbling, Floridsdorf, and Fünfhaus, and also a large building in the Schenkenstrasse, which is now to be converted to other uses. Negotiations are stated by our contemporary to have been carried on between the "Consortium for Barrack Transactions" and the Imperial Continental Gas Association for the purchase of this last-mentioned property, but to have come to a standstill owing to a disagreement as to price, which the latter fixes at 1,500,000 kr. for the house in the Schenkenstrasse and about 2,000,000 kr. for the remaining sites. It is now thought that the Municipality will make a bid for a portion of the suburban property with a view to the erection of artisans' dwellings. It is to be hoped that the price arranged will be a satisfactory one. The Municipality can well afford to treat the Gas Association well, as the latter has done most important work for Vienna for a long course of years, and seems to have been treated somewhat cavalierly in the matter of having its gas-works—a naturally unsaleable property—left as a dead-weight upon its hands. The value of house property in Vienna has been going up very much of late; and the Gas Association may, of course, decide to hold for higher values. But if it sells at its own price, the 3,500,000 kr. (or £145,000) will be some solatium on the occasion of its discontinuing the business it has carried out so long and well.

ELECTRICITY *v.* GAS FOR STREET LIGHTING.

Local Government Board Inspector's Views.

An inquiry was recently held in the Town Hall, Rawtenstall, by Mr. T. C. Ekin, M.Inst.C.E., an Inspector of the Local Government Board, in regard to an application by the Corporation for sanction to borrow £2000 for the purposes of street lighting by electricity.

Mr. E. S. Ware, the Fire Brigade and Lighting Superintendent, made a statement to the effect that there would be a saving of about half the cost of street lighting if electricity were substituted for gas. He said that at present there were 150 incandescent and 350 flat-flame lights on the main roads, costing £645 per annum for gas; and he estimated the cost of electric street lighting would be £322 10s. At the present time the gas-lamps had to be kept burning all night, to enable people to see their way in going to work in the mornings; and it was considered that the Corporation could take off about five hours per night in the winter, which would mean a saving of 670 hours. But putting the amount saved at a very moderate figure, and calling it 400 hours, it meant an economy of £120. Asked by the Inspector if he was satisfied he could carry out the work for the amount applied for, Mr. Ware replied that he was perfectly satisfied. The Inspector said he appreciated the fact that incandescent mantles could not be put on the lamps on the hillsides, but he thought more mantles might have been tried. Mr. Ware said they had tried them on some of the lamps, and found the cost too heavy. Last year they used 1¼ mantles per lamp per month. It had cost them 2s. 9½d. per lamp for mantles; and new electric globes would only cost 2s.

Mr. Rothwell, the Chairman of the Lighting Committee, stated that they had gone fully into the matter. They had tried to get the price of gas reduced from time to time, and had decided to adopt electric lighting for the streets, even if it cost as much as lighting by gas. Seeing that the Corporation were generating their own electricity, it had been their idea from the first to have electric lighting in the streets. The Inspector asked Mr. Rothwell if they would be satisfied even if there was no saving; and he replied that they would, because they would get a better light. The Inspector said he was doubtful about the saving. Mr. Rothwell said that even if there was none, the Corporation were desirous of going on. The Inspector said this simplified matters very much. He took it that the Corporation wished to have the electric light on two grounds—because the lighting would be better, and because they would be able to supply their own illumination from their own works. Mr. Rothwell said these were the two principal points; and, of course, the Corporation would have direct control.

PUBLIC LIGHTING QUESTION AT HYDE.

Town Council Decide on Gas as against Electricity.

For considerably more than a year, the question of improved street lighting has been before the Hyde Town Council; and a determined effort has been made on behalf of the Stalybridge, Hyde, Mossley, and Dukinfield Tramway and Electricity Board to bring about the introduction of electricity for the purpose. A Sub-Committee was appointed to carry out tests with the two illuminants, and prepare a statement showing the cost of lighting the main thoroughfares of the town with gas and electricity. The Directors of the Hyde Gas Company, who have hitherto supplied gas for street lighting purposes at 3s. per 1000 cubic feet, less 25 per cent. discount, making the net cost about 2s. 3d., were invited to fix up four lamps in the centre of the town; and the same privilege was given the Joint Electricity Board—the understanding being, of course, that the lamps should be of equal candle power. At a meeting of the Town Council on Monday of last week, the rival claims of electricity and gas came forward for consideration, on a report presented by the Special Committee appointed to deal with the matter.

In order to assist the members of the Council, Mr. James Diggle, the Borough Surveyor, had drawn up a statement showing the comparative cost of street lighting with gas and electricity. It was as follows:—

Electric Lighting.

Cost of 200-watt lamps in Market-Street—	
Wiring and fixing	£1 10 0
Two 100-watt lamps (Osram), at 4s. each	0 8 0
Cost of installation	£1 18 0
Maintenance—	
Cost of electricity per 1000 hours at 220 watts per hour at 0·825d. per unit	£0 15 0
Renewing lamps every 1000 hours, at 4s. each	0 8 0
Time fixing lamps	0 0 6
Lighting and cleaning	0 3 0
Cost of maintenance per 1000 hours	£1 6 6

Gas.

Cost of two-light gas-lamps in Market Street—	
Cost of inverted fittings per lamp	£0 15 0
Connecting gas-service	0 10 0
Cost of installation	£1 5 3
Maintenance—	
Cost of gas per 1000 hours, 3½ cubic feet per burner, or 7 cubic feet per lamp	13s. 6d.
Renewing fittings every four years, cost per 1000 hours	0 7½
Renewing mantles per 1000 hours	1 4
Time refitting mantles	1 5
Lighting and cleaning 12 weeks—1s. 9d. lighting, 1s. 3d. cleaning	3 0
Cost of maintenance per 1000 hours	19s. 10½d.

After a heated discussion, the Town Council decided, by eleven votes to six, in favour of gas for street lighting. The first installation of the new gas-lamps will be in the two main thoroughfares of the town—that is, from Tower Street to Newton Street, and from the Town Hall to Mottram New Road. Next year, when the estimates are being prepared, provision will be made for an extension of the system.

Referring to this matter, our local correspondent says: Considering the great influence brought to bear in support of the claim of the Joint Board to supply electricity from their own generating station for the lighting of the streets of Hyde, and the fact that the gas supply of the district is in the hands of a private Company, the decision of the Town Council is all the more notable. The competition of the Joint Board has not always been conducted on exactly fair lines; and yet the Hyde Gas Company, of which Mr. Charles Potts is the Manager, have not only held their own, but have increased their output and the number of their consumers. The first half of this year, for instance, showed an increased make of more than 4 million cubic feet compared with the corresponding half of 1910.

Since its inception, the undertaking of the Joint Board has never made a profit. In fact, there has been a total loss on it of upwards of £83,000, of which each constituent authority has had to bear an equal share. So that from the very start the undertaking has been a burden to the ratepayers. The Hyde Gas Company are large ratepayers (in the borough of Hyde their property has a rateable value of nearly £4000); and it has seemed to the Directors of the concern a little hard that they should be compelled to contribute, through the medium of the rates, to financing what is undoubtedly a rival undertaking, which, if it had not been supported out of the rates, would have been wound up long ago. When the Joint Board last made application for sanction to borrow more money for the electricity installation, it was shown at the inquiry held by a Local Government Board Inspector that the Board, in order to get a footing with large consumers of gas, had offered to supply, and were supplying, current at less than cost. This is, of course, not the first time that there has been a test competition in Hyde between the Gas Company and the Joint Board. Two years ago this autumn there was a five weeks' competition at the Hyde Philanthropic Burial Society's Hall in Hammett Street; and in this competition the cheapness of gas for artificial lighting, domestic, and other purposes was clearly demonstrated to the parties most concerned, who are now customers of the Gas Company. The competition extended from Oct. 20 to Nov. 25, 1909; the number of hours' burning being 42½, and the consumption of both gas and electricity registered by meters. One 250-candle power Graetzin inverted gas-lamp consumed 350 cubic feet of gas at 3s., less 7½ per cent. discount, equal to 11¾d. The 100-candle Osram electric lamp consumed 6 units of electric current at 3½d. per unit, less 10 per cent. discount, equal to 1s. 7d.

Therefore, to obtain 250-candle power, it would cost the consumer for electricity 3s. 11½d., or more than four times the cost of gas. In the test for street lighting, when prices were admittedly cut to the very lowest possible point, there is roughly a difference of about 50 per cent. on the cost of installation and 25 per cent. on maintenance between electricity and gas, and in favour of the latter.

The Discussion in the Council Chamber.

Mr. ROBINSON, who moved the adoption of the Highways Committee's minutes, including the one relating to improved street lighting by gas instead of electricity, said the members of the Committee had been occupied for a considerable time considering this question, and the fullest inquiry had been made, in regard to the relative merits and cost of the two illuminants for street lighting. From the statement prepared by the Borough Surveyor (Mr. Diggle), members of the Council would see that the cost of electric installation was 50 per cent. more than gas; and maintenance, taking the price of current at 0·825d. per unit, as first quoted by the Joint Board, was 33 per cent. more. Subsequently, however, the Borough Surveyor was informed by the Engineer to the Joint Board that the lamps would be charged at the rate of 13s. 9d. each for current; and this reduced the price of current to 0·75d. per unit, in which case the maintenance was reduced from 33 to 25 per cent. dearer than gas. He also pointed out that a man employed at the rate of 6d. per hour could fit up and repair the gas-lamps; whereas for electricity they would require an electrician. He added: "After very carefully going into the figures and examining the lights in the streets, the Committee can see no reason for fitting up electric light; and they have decided to carry out the street lighting improvement with gas. I would further point out that, in my opinion —and I think it is the opinion of the Committee generally—the electric light cannot be compared with gas-light in its diffusive power."

Mr. FOWDEN, in moving an amendment that the whole matter as to street lighting be referred back, said that, as a great deal of time had been spent by the Committee in the consideration of this matter, a postponement for a month would not make any difference. He suggested this, so that further experiments might be carried out. The Joint Board had made an offer which he thought ought to be considered; and this was to light a complete street in a permanent manner with electricity, such street to be at right angles to a street lit with incandescent gas, so as to get a fair comparison. He desired also to call attention to the fact that the Borough Surveyor, in his statement, had made no allowance for cracked glasses in the incandescent lighting figures; and everybody knew that the glasses did crack now and then. Next, he understood that the Council were charged 2s. 3d. per 1000 cubic feet for the gas used for street lighting; but according to the Borough Surveyor's statement the price worked out at 1s. 11½d. per 1000 cubic feet. If the Gas Company had reduced the price, he would like to know when and how it happened, and if this price was to obtain all over the town.

The TOWN CLERK read the letter received from the Hyde Gas Company, which gave the quotation. It was as follows: "In reply to your letter of Aug. 5, 1911, asking this Company for a quotation for supply of gas for street-lamps by an improved type of incandescent lighting, which it is proposed to erect through the main thoroughfares of the borough, my Directors have given the matter their fullest consideration; and they are now prepared to supply gas in the area in question at the reduced rate of 13s. 6d. per lamp, each lamp containing two burners having a consumption of 3½ cubic feet per burner per hour, for 1000 hours' lighting. It is limited to the area in question."

Dr. BEECROFT, who took part in the discussion, submitted for the consideration of the members of the Council a tabulated statement showing that it was untrue for the advocates of electric lighting to say that gas had been losing ground in recent years so far as street lighting is concerned, and also told the Council that, after an exhaustive inquiry in this country and on the Continent, a deputation from the Corporation of the City of London reported that "high-pressure incandescent gas-lamps with inverted burners should be adopted as the illuminant;" and that after a complete series of experiments and consideration of competitive tenders, the Westminster City Council selected high-pressure gas for the lighting of the most important West-end thoroughfares, purely because gas was found to give the best light for the least money. Dr. Beecroft quoted the experiences of other large centres, and gave figures to support his contention that gas was by far the best and cheapest illuminant for street lighting purposes. Coming to deal with Hyde, he said the local Gas Company had met them in a business-like manner, and had fitted up at their own expense eight lamps with different types of burner. On the other hand, the Joint Tramway and Electricity Board brought "a few fancy things," but did nothing which was likely to convince the Committee of the alleged superiority of electricity over gas.

After further discussion, the Committee's recommendation that gas be adopted in the scheme for improved street lighting in the main streets of the borough, in preference to electricity, was approved, as stated.

Price of Gas at Croydon: A Correction.—In the "Editorial Note" last week entitled on "A Statistical Examination," it was stated that at Michaelmas the price of gas at Croydon would be reduced by 1d., making it 2s. 6d. The latter figure should have been 2s. 5d.; a reduction to 2s. 6d.—the lowest price reached in the history of the Company—having been made at Lady Day last. They have now gone one better.

Gas Purchase Question at Bedwellty.—The Bedwellty Urban District Council have discussed at length the question of purchasing the Blackwood Gas-Works. The Company objected to the purchase of the works until some arrangement was made regarding the parliamentary costs involved in connection with the opposition to the Council's last Bill. It was decided that the negotiations should be continued with a view to an amicable settlement being arrived at, so that the purchase of the Blackwood works should be embodied with that of the New Tredegar Gas-Works in a Bill to be promoted in the next session of Parliament.

MUNICIPAL WORKERS AND NON-UNIONISTS.

Decision of Manchester Men Not to Strike.

A mass meeting of municipal employees in Manchester, Salford, and neighbouring towns was held on Saturday afternoon at Manchester, to decide whether or not they should carry out a resolution that members of the Municipal Employees' Union should refuse to continue to work with non-unionists. At half-past twelve in the morning a meeting of the Salford municipal workers was held outside the Corporation tramway sheds in Frederick Road, and the proceedings were characterized by some rowdy scenes. Councillor Jones, Secretary to the Municipal Employees' Union, was repeatedly interrupted in the course of a speech advocating that the municipal workers should act together in refusing to work with non-unionists; and there were several "scraps" among sections of the audience requiring the intervention of the police. The tramway workers who had refused to join in the movement were denounced by Councillor Jones amidst loud hooting; and he also criticized a recent appeal made by Alderman Jackson, Secretary of the Tramway and Vehicle Workers' Union, who had said the tramwaymen held the key to the position. "Let me tell Alderman Jackson," declared Councillor Jones, "that he does not hold the key to the position. The whole of the workers in the electricity generating station are in our Association, and if we decide at our mass meeting this afternoon to come out on strike, it will be without consulting Alderman Jackson. We are going to have the support of the gas workers, cleansing department employees, and other classes of municipal workers, in such numbers as will ensure our success; and if we can cut off the electricity supply, Alderman Jackson and his men can go fishing."

At Sunday's meeting, Councillor Jones said he had reason to believe they would get their grievances remedied without having recourse to a strike. After a number of speeches had been made on the need for men in the various departments having better wages and conditions of employment, a resolution was adopted to the effect that the members of the Union continue at work, and that the leaders approach the Committees of the Corporations affected, with a view to obtaining a redress of the men's grievances.

NELSON CORPORATION WATER-WORKS.

Increased Storage.

There is now in course of construction for the Nelson Corporation a reservoir which is expected to cost something like £40,000. It is the largest and the most important undertaking of its kind the Corporation have ever entered upon; and it will place the town in a position to meet the water requirements of the inhabitants for many years. At present, Nelson serves a population of 60,000; including in its area the borough and several outside places. The source of supply is two drainage areas, one of which, 400 acres in extent, is situated four miles east of the town on the borders of Yorkshire; and the other, 1100 acres, four miles west of the town on the Pendle Hill. In both cases surface springs exist.

During the year 1910, the town experienced a severe drought. At the beginning of the summer, there was only 112 days' supply in store; and it was felt that this was certainly below requirements. The position, however, became so serious that it was found necessary to curtail the consumption for a time to four hours per day; there being at that period considerably less than a 50 days' supply in the reservoirs. The same year, therefore, tenders for the work of constructing the Lower Ogden Reservoir were obtained; but, after full consideration, the scheme was allowed to drop—a strong feeling being expressed that the expense was not warranted in the then state of the area's growth. At the same time, during the last twenty years the population which Nelson serves has grown enormously. In 1881, it was 19,223; in 1891, 33,476; in 1901, 47,326; while to-day it is computed, as already stated, at 60,000.

It was originally intended to construct three reservoirs in the Ogden Valley. One of them—known as the Upper Ogden Reservoir—with a capacity of 54 million gallons, was completed in 1903 at a cost of £22,000, exclusive of land; but the second had to be abandoned owing to the costly work of construction. The one now in progress is the third. The present storage is 134½ million gallons, contained in the Coldwell reservoir, which has a capacity of 80 million gallons, and the Upper Ogden Reservoir, with 54½ millions. The estimated consumption in 1901 was 1¾ million gallons per day, or 26·4 gallons per head. In 1907, the population having reached about 55,000, the consumption had increased to 28·8 gallons per head; and whereas in 1901 it was estimated that there was 137 days' supply, this fell year after year until in 1907 there was only 96 days' supply. The whole question being one which vitally affects the health of a town, the construction of an additional reservoir could not be indefinitely postponed. The water supplied by meter for trade purposes was also increasing enormously; and therefore, on Feb. 20, 1908, it was finally decided to proceed with the construction of the reservoir under notice. The following June, the preliminary task of building the culvert and cutting the trench was commenced; and, few difficulties having been experienced, the work has progressed in a perfectly satisfactory manner. In the case of the trench, it was necessary to go down 100 feet for a water-tight bottom. This has now been filled up, and the banking at present reaches a height of 39 feet above the old stream level. This, however, has yet to be raised an additional 41 feet; and some ten to sixteen months must elapse before the work is completed.

When finished, the reservoir will have a holding capacity of 150 million gallons; so that the storage will be more than doubled. The Corporation will then be in a position to supply a population of 80,000, with 30 gallons per head per day for 195 days.

The Brighouse Town Council have been notified that the Hipperholme District Council have decided to take over the undertaking of the Bailiffe Bridge Gas Company, and are prepared to take the gas in bulk from the Brighouse Corporation.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

I have been present this afternoon at the proceedings at Helensburgh in connection with the official opening of the installation of Glover-West vertical retorts. The installation is of more than usual interest, on account of its being the first one which has been added to the work-a-day plant of a gas-works in Scotland; also because—and this is of more importance than the other point—it brings into the field of actual fact the feasibility of working the Glover-West system of retorts in an installation which serves a works producing less than 100 million cubic feet a year. The success which has attended the introduction of the vertical-retort system in Helensburgh is undoubted. This will inspire others, whose works are not regarded as large, to look into the possibilities of vertical-retort carbonization. Nothing, in this respect, can be more instructive than to learn of the success; and as Mr. Blair is to give the results of his working at the North British Association meeting in Glasgow on Thursday next, this condition will be then met. It is, therefore, unnecessary to say more here at the present time; and I may only add that, having seen the works, I thoroughly endorse all that was said at Helensburgh regarding the quality of the work which has been put into the construction of the installation by West's Gas Improvement Company. Mr. Blair is certainly to be congratulated upon his courage. He has his reward, so far, in the heartiness of the proceedings on Saturday; and he will doubtless have more next week.

The accounts of the Aberdeen Gas Department for the year ending July 31 have been issued this week by the Gas Treasurer (Mr. J. T. Sorley). The revenue account for gas shows that, after charging £10,989 as sinking fund for the reduction of mortgages and gas annuities, and carrying £3000 to the renewal fund, and £300 to the fire insurance fund, there is a credit balance on the account for the year of £3728, which, added to the sum at the beginning of the year, makes £7776 to be carried forward to the credit of the current year's account. The net liabilities in connection with the gas undertaking at July 31 amounted to £132,921; being the amount of borrowed money, accounts due to tradesmen, &c., less gas accounts payable, value of stock in hand, &c., £16,870. Gas annuities held by the public were valued in 1897 at £156,557. At the present market price, the value of these is £116,051. The total of the capital account is £446,221, there having been added during the year £3265. The surplus of assets over liabilities is stated at £28,803. A decrease is shown in the value of meters of £1848, and of gas-stoves of £850. The revenue account sets forth a total revenue of £125,467, and shows that gas and meter rents of the ordinary consumers amounted to £75,396; receipts for gas for motive power, to £7001; and receipts through prepayment meters, to £13,696. From the residual products there was realized £26,596—from coke, £14,627; from tar and ammoniacal liquor, £11,967—and from gas-stoves, £1759. The manufacture of gas cost £78,442; distribution, £5112; rents, feu-duties, and taxes, £6728; management, £1919; general charges, £921; and discounts and bad debts, £4023. The total expenditure was £99,828. The balance carried to net revenue account has been £25,639. The arrears of gas-rents at July 31 amounted to £1347; and the stock on hand, to £8731. The cost of coal, including freight, harbour dues and wages, was £53,564; and gas oil to the amount of £3593 was used. The quantity of gas made was 817,734,000 cubic feet, compared with 794,775,000 cubic feet in the preceding year. The Gas Committee on Wednesday considered the accounts, and resolved to recommend the Town Council to reduce the prices for gas to ordinary consumers from 2s. 6d. to 2s. 3d., and to users of gas for motive power from 2s. 3d. to 1s. 11d.; and to retain the price to prepayment consumers at 1d. per 29 cubic feet. The Committee also, on a report by the Gas Engineer (Mr. S. Milne), resolved to recommend that, as from Whitsunday last, rental be not charged upon cooking appliances. It is proposed to hold an exhibition of gas appliances in Aberdeen early in October.

Having before me copies of the annual accounts of the Corporations of both Glasgow and Edinburgh, there may be some interest if I cull from them a few figures with reference to the cost of gas produced per 1000 cubic feet sold. In Glasgow, the cost of coal last year was 12·93d., and there was received for residual products 9·65d., leaving the net cost of coal 3·28d. Other manufacturing charges amounted to 9·67d.; distribution charges, to 2·87d.; management, to 0·73d.; and rents, feu-duties, taxes and assessments, law and parliamentary charges, retiring allowances, depreciation charged to capital, sinking fund, and interest paid on capital, to 9·73d. The total cost was 23d. In Edinburgh, the cost of coal was 1s. 0·04d.; and other manufacturing charges raised the cost to 1s. 6·50d. Distribution charges amounted to 3·51d.; gas stoves and appliances, to 0·97d.; management, to 1·44d.; rents and feu-duties, rates and taxes, to 2·98d.; and allowances to ex-employees, contributions to superannuation fund, compensations, law expenses, and bad debts, to 0·74d. The total cost was 2s. 4·14d. From this there was deducted, for residuals sold, 8·51d.; for rental of stoves, prepayment meters, &c., 0·95d.; for stair lights, 0·76d.; for gas appliances, &c., 0·47d.; and for sundry revenue, 0·13d.; making a total deduction of 10·28d., and leaving the net cost of gas per 1000 cubic feet of gas sold at 1s. 5·32d. The revenue from gas, less discounts, amounted to 2s. 7·99d.; and the balance of 1s. 2 67d. was gross profit. If any attempt were made to institute comparison between these sets of figures, it would lead to a useless result, as the analyses are not made on the same basis. For instance, in the Glasgow accounts the items of depreciation, sinking fund, and interest paid on capital are included. These items amount to 7·55d.; and with this sum deducted from 23d., it would leave the cost of gas at 15·45d. In Edinburgh, there is no depreciation; but the charges for sinking and reserve funds, interest, and annuities are stated as charges upon the gross profit of 1s. 2·67d. The sums amount to 1s. 1·94d.

A return has been prepared by Mr. Jas. Nicol, the City Chamberlain of Glasgow, of the revenue, expenditure, and interest for the year to May 31, 1911, and of the assets, liabilities, and sinking funds of the Corporation departments. It is shown that the revenue of all the departments amounted to £3,946,823—an increase over the preceding year of £139,911. The total expenditure, including interest, year's sinking fund, and depreciation and reserve funds, was £3,874,344—an increase of £92,216. Net interest amounted to £526,687—a decrease of £33,240. The total assets are stated at £24,910,703—an increase of £314,658. Liabilities, exclusive of sinking funds, are stated at £16,398,441—a decrease of £202,746. Sinking funds, reserve funds, and other bookkeeping liabilities, are shown at £8,761,681—an increase of £610,507. The Gas Department used to be the largest trading department of the Corporation, and I doubt not is so still; but in this return, by linking the Common Good and Tramways Department together, the Gas Department is considerably eclipsed. The revenue of the Common Good and Tramways is stated at £1,099,958. That of the Gas Department is given as £896,046; the expenditure, including interest, &c., at the same figure; net interest, at £72,943; assets, at £2,684,700; liabilities, excluding sinking funds, at £1,805,746; and sinking and reserve funds, &c., at £981,549. A comparison with the Electricity Department may be interesting. The revenue in that department is stated at £260,526; the expenditure, including interest, &c., at the same; net interest, at £58,605; assets, at £1,996,360; liabilities, exclusive of sinking funds, at £1,672,744; sinking and reserve funds, &c., at £323,616. The Water Department is one of the greatest of the Corporation undertakings. The revenue is stated at £260,141; the expenditure, including interest, sinking fund, &c., at £250,234; net interest, at £95,397; assets, at £4,429,544; liabilities, excluding sinking funds, at £2,716,503; sinking and reserve funds, &c., at £1,713,041.

While I write [at Dunoon] the rain is falling mercilessly, as it has done nearly all day. The conditions are the opposite of pleasurable; but there is consolation to be had in the fact that a long-continued dry period has manifestly come to an end, and there is now no danger of water famine, the fear of which had begun to trouble the minds of local authorities. It may be said that in Scotland the water supplies to all the larger places are quite ample for any contingency regarded as possible, with the exception, perhaps, of Aberdeen, where an augmentation has been under consideration for some years. It is among smaller places that scarcity of water has been felt this season; and even among them the drought has been quite sectional. North of the Tay there does not seem to have been anything unusual experienced; but in Fifeshire and Linlithgowshire there were considerable straits. In the case of Fifeshire, the situation was aggravated by the fact that around the coast there is an annual influx of people on holiday, sometimes to the extent of double the population; and to provide water for these summer visitors, is a severe tax upon the conditions of supply, which are at all other seasons found to be quite sufficient. The inland towns of Cowdenbeath and Lochgelly, neither of which is, however, much sought after by the summer visitor, have been under the necessity of obtaining supplies from the Dunfermline Corporation Water-Works; the former to the extent of 700,000 and the latter of 100,000 gallons daily. In other places, temporary expedients have been resorted to—such as pumping water from limestone quarries at Leven and Lundin Links, and the utilization of the surplus supply from the private well of a distillery in another instance. There was difficulty in obtaining water for railway engines; but going farther afield for supplies got over this. So far, I have not heard of the stoppage of mills or factories through want of water, except to a very trifling extent; but warning notices as to impending enforced cessation were common. All this risk is at an end now for a season, as the rainfall (which began on Thursday, the 24th ult., and has been experienced about every alternate day since) has been sufficiently copious to replenish depleted reservoirs. One outcome of the situation has been the resolution, already taken in more places than one, to call in the aid of consulting engineers to advise as to the best means for augmenting existing supplies. I would have liked to have been able to give figures as to the rainfall; but these are not yet forthcoming.

Mention is made in the preceding "Notc" of the water supply of Aberdeen. It will be within the recollection of some that the Corporation promoted a Bill in the last session of Parliament for the taking of a new water supply from the River Avon, which rises among the Cairngorm Mountains, and flows into the River Spey, and that the measure was defeated. The measure was the pet scheme of Lord Provost Wilson. His party did not take the defeat with good grace; and while they have not given much indication of a desire to renew the Avon scheme, those in the Corporation who opposed them, and who favoured the continuance of the taking of the water supply from the River Dee, have gone in for a policy of giving their own pet scheme all the airing they possibly can. The water accounts of the Corporation for the past year have been published, and show a handsome balance. The situation is so favourable that the Water Committee have fixed the rates for water at the same figures as for the past year—5d. per £1 for domestic supply, and 1¼d. per £1 for public supplies. It has been resolved to add £8771 to the sinking fund; and the interesting information is given that this clears off the entire debt due on the existing water-works, and leaves a balance of £7761. What to do with this sum was discussed by the Water Committee on Tuesday, when it was revealed that the cost of promoting the abortive Avon scheme was £15,521. The proposal was made that the surplus should be applied in paying off half this sum. A decision was not come to; but the subject was sent forward to the Town Council, to be disposed of there.

Sidmouth Gas Company and Electricity Supply.—As already announced in the "JOURNAL," the Sidmouth Gas and Electricity Bill, promoted by the Sidmouth Gas Company, has received the Royal Assent; and under the Act, the Company are possessed of powers to supply Sidmouth with electricity. It is stated, however, that nothing will be done for twelve months or so, pending the decision of the District Council as to whether or not they will acquire and carry on the Company's undertaking.

Altrincham Gas Company's Increased Profits.—At the half-yearly meeting of the Altrincham Gas Company the report of the Directors showed that the profit for the six months ended June 30 was £5693, compared with £5272 in the corresponding period of 1910. It was stated that the sales of gas had increased by 2,498,000 cubic feet. The balance-sheet showed a sum of £9232 available for distribution. After payment of the full statutory dividends (10 and 7½ per cent. respectively on the original and new ordinary shares), there was left a balance of £5579 to be carried forward. The report was adopted.

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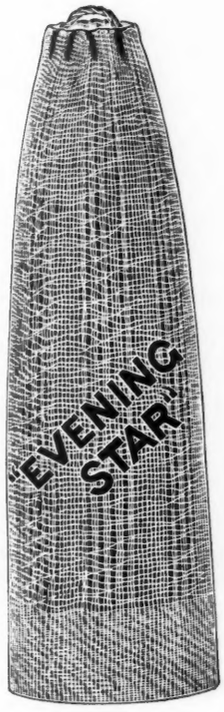

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CURRENT SALES OF GAS PRODUCTS.

[For Table of "Tar Products Prices," see p. 613.]

LIVERPOOL, *Sept.* 2.

Sulphate of Ammonia.

Notwithstanding the settlement of the difficulties in the way of transport, with the turn of the month there has been a distinct falling off in the demand for sulphate of ammonia, and values have receded to a small extent from the highest point reached. At the close the tone of the market is quiet, and the quotations are £14 per ton f.o.b. Hull, £14 1s. 3d. per ton f.o.b. Liverpool, and £14 3s. 9d. per ton f.o.b. Leith. With the easier position for near delivery, there has been little inclination to operate for future shipment. Manufacturers continue to quote £14 7s. 6d. per ton f.o.b. at the principal ports for delivery in equal monthly quantities up to the end of this year or over the first half of 1912, but no business has been reported thereat.

Nitrate of Soda.

This article is a quietly steady market at 9s. 10½d. per cwt. for 95 per cent. quality and 10s. 1½d. for 96 per cent. on spot.

LONDON, *Sept.* 4.

Tar Products.

There is little or no alteration in the markets for tar products; but prices on the whole remain firm. In pitch, the inquiry is steady, and prices have been well maintained. Benzols are firm, especially for prompt delivery. Solvent naphtha still remains quiet. There is a fair demand in heavy naphtha. Creosote appears to be a good market, and prices are firm for both prompt and forward delivery. Crude carbolic continues in about the same position.

The average values during the week were: Tar, 21s. to 25s. *ex* works. Pitch, London, 40s. 6d. to 41s. 6d.; east coast, 40s. to 41s.; west coast, Manchester, 39s. 6d. to 40s. 6d., f.a.s.; Liverpool, 40s. 6d. to 41s. 6d., f.a.s.; Clyde, 40s. to 41s., f.a.s. Benzol, 90 per cent., casks included, London, 9¾d. to 10¼d.; North, 9¼d. to 10d.; 50-90 per cent., casks included, London and North, 9¼d. to 9½d. Toluol, casks included, London, 10d.; North, 9¼d. to 9½d. Crude naphtha, in bulk, London, 4d. to 4¼d.; North, 3¾d. to 3¾d.; solvent naphtha, casks included, London, 11¼d. to 11½d.; North, 10d. to 10½d.; heavy naphtha, casks included, London, 11½d. to 1s. 0½d.; North, 10d. to 11½d. Creosote, in bulk, London, 2½d. to 2 5/16d.; North, 2⅛d. to 2¼d. Heavy oils, in bulk, 2¾d. Carbolic acid, 60 per cent., casks included, east coast, 2s. to 2s. 3d.; west coast, 1s. 11d. to 2s. 2d. Naphthalene, £4 10s. to £9; salts, 42s. 6d. to 45s., bags included. Anthracene, "A" quality, 1¾d. to 1⅞d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article remains firm, although there is practially no alteration in price. Actual Beckton is quoted £13 15s.; outside London makes, £13 12s. 6d.; Hull, £14 2s. 6d.; Liverpool, £14 5s.; Leith, £14 7s. 6d.; and Middlesbrough, £14 2s. 6d.

COAL TRADE REPORTS.

Northern Coal Trade.

There has been a heavy shipment of coal during the last few days, and thus the stocks of consumers will be added to, after the depletion in some instances in the strike period. Steam coals are a little quieter. Best Northumbrians are from 11s. to 11s. 3d. per ton f.o.b., second-class steams from 9s. 6d. to 10s., and steam smalls from 5s. to 6s. Except for lack of ready steamers, the output is well taken up generally. In the gas coal trade, the demand is very good for this season; and the price is firm. Durham gas coals are quoted at 11s. to 11s. 1½d. per ton f.o.b. for best kinds; second-class gas coals are 9s. 9d. to 10s.; and for "Wear specials," the quotation is about 11s. 6d. to 11s. 9d. Very few contracts were reported in the last few days; but one, for some 11,000 tons, for Magona, shipped this autumn, is said to have been concluded at about 18s. per ton for best Durhams, delivered. Some sales are also reported of cargoes of good gas coal at 17s. 6d. per ton delivered at Genoa. There is, however, rather less disposition to sell coal for forward, unless at higher prices, owing to the unrest at the collieries, and the agitation for a higher minimum wage. Coke is a little more plentiful in supply. Good gas coke is quoted from 14s. 3d. to 14s. 9d. per ton f.o.b. in Tyne or Wear.

Scotch Coal Trade.

Trade has been more active; the advance in prices for shipping being fully maintained. From the coalowners' point of view, there is a better outlook. Prices may now be quoted at: Ell, 9s. 3d. to 10s. 3d. per ton, f.o.b. Glasgow; splint, 9s. 9d. to 10s.; steam, 9s. 3d. to 9s. 6d. The shipments for the week amounted to 338,575 tons—an increase on the previous week of 9345 tons, and on the corresponding week of 5502 tons. For the year to date, the total shipments have been 10,553,134 tons—an increase upon the corresponding period of 128,837 tons.

Watford Gas Company.—At the recent half-yearly meeting of this Company, the accounts presented showed a profit of £4593 for the six months ended the 30th of June, and a sum of £7403 available for distribution. The Directors recommended a dividend at the rate of £7 7s. 6d. per cent. per annum on the "A" stock, and £5 17s. 6d. per cent. per annum on the "B" stock, both less income-tax. The make of gas in the half year amounted to 120,353,350 cubic feet, of which 114,334,100 cubic feet were sold and 115,652,000 cubic feet in all were accounted for.

Testing Gas-Meters at Hyde.

The minutes of the Watch Committee of the Hyde Corporation, read and confirmed at a meeting of the Council last week, contained the following: Read letter from Mr. Walter Gee with respect to the testing of gas-meters. The Town Clerk reported upon the statutory provisions as to testing of gas-meters; and, after consideration, the Committee decided not to take any action. It was explained by the Town Clerk at the Council meeting that Mr. Gee had recently seen a report in the newspapers of the proceedings of the Manchester City Justices, who acted as the gas-meter testing authority under the Sale of Gas Act; and he (Mr. Gee) wanted to know whether the Sale of Gas Act might be made use of by the Hyde Corporation. The answer to this was in the affirmative. The Corporation could adopt the Act if they thought fit; but it would mean, said the Town Clerk, setting up rather elaborate machinery for gas-testing, and they would have to appoint an inspector—probably a qualified man. The suggestion of Mr. Gee that this duty might be entrusted to the Inspector of Weights and Measures was not feasible, unless such Inspector had had some prior training. The Town Clerk added that it was doubtful even then if it would be of much use in Hyde, because there was an arrangement in force now with the Gas Company by which a consumer could have his meter tested, under certain conditions, if he had reason to doubt its accuracy. Under the circumstances, the Committee decided not to take action in the matter; and this was endorsed by the Council.

Sale of Shares.—At the Church Inn, Tintwistle, last week, Mr. J. T. Goddard, of Glossop, offered for sale by auction a number of shares in the Hollingworth Gas Company, Limited. Ten "A" £1 shares were sold at £1 6s. 6d. each, and 29 "B" shares, of the same nominal value, changed hands at £1 2s. 6d. apiece.

Waltham Abbey and Cheshunt Gas Company.—At the recent half-yearly general meeting of this Company, the Directors reported a balance of £3379 available for distribution; and they recommended dividends at the rates of 8½ per cent. per annum on the "A" shares, and 6½ per cent. per annum on the "B," "C," and "D" shares. The payment of these and the debenture interest required £2442; leaving £937 to be carried forward. The quantity of gas sold in the half year was 39,360,200 cubic feet; and out of a make of 42,307,000 cubic feet, 40,276,000 cubic feet were accounted for.

More Burst Water-Mains.—Owing to the bursting of a 2-inch water-main in High Holborn shortly before ten o'clock on the night of the 27th ult., a portion of the roadway from Fetter Lane to Holborn Circus and another portion in Farringdon Street, 200 yards distant, were rendered unsafe for traffic. The Gosport Water Company sustained a considerable loss of water last Tuesday by the bursting of their chief main at Fareham, between headquarters and the reservoirs at Soberton. Much damage was caused last Wednesday by the bursting of a 36-inch water-main at Milngavie, near Glasgow. Water rushed down into the village, flooding houses, shops, and the Town Hall. Eventually the supply was cut off, and in consequence several factories and public works in Glasgow were temporarily closed, while the domestic supply was also seriously affected in the north-western district.

Swansea Water Scheme.—On Thursday afternoon, the Chairman of the Swansea Water Committee (Alderman T. T. Corker) formally opened the Morriston service reservoirs, which complete the present water-works system of the town, and have been constructed, at a cost of about £20,000, for the purpose of distributing water over a large area of the borough. They are twin reservoirs, covered in below ground, and are constructed of steel and concrete, to hold 2 million gallons each. They are at such an elevation as to be able to supply nine-tenths of the population of Swansea. The reservoirs were built from the plans of Mr. R. H. Wyrill, the Swansea Water-Works Engineer; and the contract was carried out by Messrs. Aird and Sons, under the superintendence of their agent, Mr. Avant, and his assistant, Mr. Wilkinson. A gold key was presented by the Contractors to Alderman Corker, with which he unlocked the doors of the valve-house.

Cork Gas Consumers' Company.—The accounts of this Company for the six months ended June 30 last, which were presented at the half-yearly meeting last Thursday, showed a balance of £5507 on the profit and loss account; and the Directors proposed to pay a dividend at the rate of 8 per cent. per annum. In moving the adoption of the report, the Chairman (Mr. George Lynch) said the demand for gas for lighting, cooking, &c., continued to increase. The quantity sold during the past half year showed an increase of nearly 3 million cubic feet, chiefly in the slot meters and cookers, indicating that the convenience and economy of gas were being more extensively appreciated by a class of smaller consumers. The slot meters now slightly exceeded the others in number; both together being upwards of 9500. The Directors had done better with the residuals, owing principally to a larger production of coke, and having a ready sale for it at fairly good prices. The report was adopted.

Gas v. Electricity for Pumping Water.—The Norton (Malton) Urban District Council were informed at their meeting on Monday last week, that the Water Committee had advertised for tenders in connection with the pumping of the water at the reservoir. The Northern Counties Electricity Supply Company offered to do the work for five years on the same terms and conditions as those existing, with the exception that the charge was to be a flat-rate of 1¼d. per unit net. If the contract was to be for one year only, the charge would be 1½d. per unit. The number of units used during the year ended June 30 last was 32,832; and this at 1¼d. per unit would amount to £171 per annum. The Malton Gas Company offered to pump the water for £96 a year. At the meeting of the Committee on the 21st ult., the Clerk stated that he had written to the Gas Company for further particulars with respect to their tender, and they had stated that it did not include the renewal of any of the principal parts, or the repair or renewal of the pumps or gearing. The Electricity Supply Company wrote saying that they could not reduce their tender. It was proposed that the Electricity Company be offered £150 per annum. An amendment was submitted to the effect that the Gas Company's tender should be accepted; and it was carried.

Messrs. W. Sugg and Co.'s New Lamp Catalogue.

We have received from Messrs. W. Sugg and Co., Limited, their latest catalogue of lamps and fittings. It contains particulars of their "Regent," "Littleton," and other lamps, fitted with inverted incandescent burners, in great variety. The lamps are shown suspended and with upright and horizontal fixings, and fitted with reflecting shades and advertising screens. The "Regent" lamp is made for gas consumptions ranging from 4 cubic feet, with a single burner, giving 160-candle power, up to 36 cubic feet, with nine burners and 1440-candle power. These lamps are usually fitted with lever cock and pilot-light; but they can be arranged for lighting with a flashing spirit torch. On p. 10 of the catalogue is shown a lamp with upright fixing illustrating the method of doing this. The cover is fitted with a trumpet-shaped entry, which passes to the inside of the lamp. The torch has a permanent oil flame and a supply of spirit. When it is desired to light the lamp, the end of the torch is inserted in the entry already referred to, and by lightly pressing a rubber ball attached to the torch by a tube, a portion of the spirit is atomized and blown across the oil flame, by which it is ignited, and a flame of ample volume to light the gas is sent into the lamp. Messrs. Sugg have patented this method of applying a spirit flame to the lighting of lamps, thus superseding the flash-light; and they claim for it the advantage over the latter and more general plan that it does not discolour the inside of the lamp. The system of lighting described can be employed for column, bracket, or suspension lamps; and spirit torches of various sizes, suitable for outdoor or indoor use, are shown. Another feature of the catalogue to which attention may be directed is the "Regent" lamp shown mounted with horizontal fixing for a wrought-iron bracket for street lighting. The cover of the lamps is so arranged as to be easily removable for cleaning purposes. Lamps of smaller size, with inverted incandescent burners and fitted with steel and opal glass reflecting shades and anti-vibrators (some specially adapted for general office lighting), are shown in numerous types and powers.

Rugby Gas Company.—The report adopted at the half-yearly meeting of the Rugby Gas Company stated that receipts on revenue account for the half year ended June 30 amounted to £13,323, and the expenditure to £8831, leaving a balance of £4492 to be carried to profit and loss account. This balance, added to £10,960 brought forward, with £84 interest on moneys deposited, less £169 interest on mortgage, £166 depreciation of Birmingham Corporation stock (reserve fund), and £344 depreciation of Consols (insurance fund), gave a net balance of £14,856. The Directors recommended a dividend for the half year on the original share capital at the rate of 14½ per cent. per annum (less income-tax), amounting to £2560; and a dividend on the additional capital issued at the rate of 11½ per cent. per annum (less income-tax), amounting to £303. The Directors stated that they hoped to be able to recommend a further reduction of 2d. per 1000 cubic feet in the price of gas as from Jan. 1 next. The report was adopted.

Chichester Gas Company.

In the report presented at the half-yearly general meeting of this Company last Tuesday, the Directors called attention to the loss they had sustained by the change in the public lighting from gas to electricity; but the hope was expressed that the loss was only of a temporary character, and that the sale of gas would be restored by extensions in the private and prepayment consumptions. The accounts accompanying the report showed a balance of £1861; and the Directors recommended the declaration of a dividend at the rate of 7 per cent. per annum upon the "A" capital, and £4 18s. per cent. upon the "B" and "C" capital, all less income-tax. The Manager (Mr. T. E. Pye) reported that the works and mains were in good repair and condition. In moving the adoption of the report, the Chairman (Mr. W. A. Walker) congratulated the Company on the passing of the Chichester Gas Bill, which, among other important powers, extended the Company's limits of supply to include Bosham, Chidham, Funtington, Boxgrove, Lavant, Merston, and West Stoke. He said the past half year was the first that the Company had experienced the full brunt of the loss of the public lighting of the city, which came to £568. But to set against this there was a welcome increase of £149 in the income from private lighting; thus reducing the actual loss to £419. He regarded this increase with the liveliest satisfaction, as indicating that the Company might fairly look for further expansion. It was the opinion of the Board that the Company had passed over the worst. They had, moreover, concluded more favourable contracts for coal. They were laying down plant for making tar paving, and hoped to do well with it. The dividends recommended were declared.

Maryborough (Queensland) Gas Company, Limited.—In the report presented by the Directors of this Company at the last half-yearly meeting, they stated that the profits, after making provision for bad and doubtful debts, repairs and renewals, depreciation, working expenses, wear and tear, and all other charges, including the balance brought forward, amounted to £1036, from which they recommended the usual dividend of 6 per cent. per annum (free of income-tax). This came to £773; leaving £262 to be carried forward.

Bridlington Water Supply.—An inquiry has been held at Bridlington by Major J. Stewart, on behalf of the Local Government Board, concerning the application of the Council for sanction to borrow £2000 for the purpose of laying a large water-main in connection with recently completed improvements and extensions, which cost £12,000. It was stated that the new main was required in view of the extension of the town and improved sanitary conditions. The Town Clerk said that, while the normal winter population was about 15,000, the August population was 50,000. The works were purchased in 1909 from the Bridlington Water Company, Limited, for £70,000; and £8000 had been repaid, and the works and mains maintained out of revenue. There was no opposition.

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Contaminated Water Supply.—It was lately discovered at Porthcawl that the public water supply was not fit for domestic use. The reservoir is eight miles from the town, and there were many conjectures as to the cause of the trouble until it was ascertained that the contamination was due to the water of a stream, which by special permission had been turned into the reservoir to increase the town supply temporarily. This stream, it was found, had been poisoned with carbolic acid, and hundreds of fish were floating about dead.

Douglas Gas Company and their Employees.—The statement of accounts submitted at the half-yearly meeting of the Douglas Gas Company showed a net profit for the six months of £4145, which was an improvement on the corresponding period of the previous year. There was available for distribution £7600; and a dividend of 22s. 6d. per share was declared. The report was adopted, and complimentary references were made to the satisfactory manner in which the Directors had prevented the recent threatened strike of employees. The Chairman alluded to the increased revenue from the sale of sulphate of ammonia, through the growing demand for agricultural purposes.

South Lincolnshire Water-Works Purchase Question.—A special meeting of the Spalding Rural District Council has been held to consider the desirability of purchasing the undertaking of the South Lincolnshire Water Company, including the bore at Pinchbeck West and the unfinished work in connection with it. The Company was formed to supply water to a district extending from Spalding to Sutton Bridge. Some 15 miles of pipes have been laid, and an artesian well sunk; but the works have not been completed, and the affairs of the Company are in the hands of a Receiver. An offer of the works has been made to the Council; and the price was stated to be £12,000. It was eventually decided to consult a Water Engineer, with a view to ascertaining the value of the property, and the cost of completing the works. On receipt of his report, a further meeting of the Council will be held, and possibly other local authorities will be consulted.

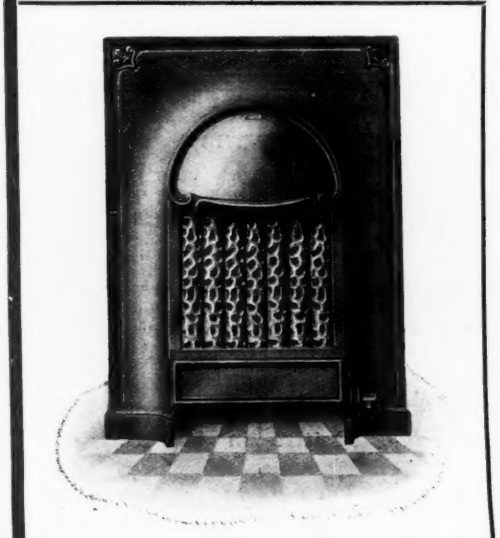
Road Tarring and Alleged River Pollution.—The question of river pollution in consequence of tarring the roads has been reported upon by the Main Roads Committee of the Hants County Council. They stated that they had arranged that the tar used on main roads should accord with a stringent specification eliminating all deleterious products which might be injurious or destructive to fish or vegetable life; and any delivery of tar found not to accord with the specification has been condemned. The precaution has also been taken of obtaining a considerable number of samples of washings from the roads in various parts of the county. These washings have been submitted to Mr. W. J. A. Butterfield, who prepared the specification, for analysis, and in every case he has reported that the sample was free from contamination by tar or tarry matters. A similar report was received of a sample which was taken from the River Lyde, from a part of the river where the tarry matter was stated to have been seen; and, having regard to these reports, the Roads Committee feel justified in thinking that the risk of contamination which is apprehended does not in reality exist.

Increased Consumption at Newark.—At the annual meeting of the Newark Gas Company, held Thursday week, the balance available for disposal was £2766. The statutory dividends were declared, at the rate of £11 5s. per cent. per annum on the "A," 5 per cent. on the "B," and £8 5s. per cent. on the new ordinary shares. The number of consumers by prepayment meters has largely increased. The quantity of coal carbonized in the past year amounted to 9009 tons; and it produced 95,539,400 cubic feet of gas—being an increase of 1,611,700 cubic feet.

Romford Gas Company.—The half-yearly meeting of this Company was held on the 26th ult.—Mr. J. Smith (the Chairman) presiding. The amount available for distribution was £7002; and the Directors recommended the payment of dividends at the rate of 13 per cent. per annum on the original shares, and of 10 per cent. per annum on the "B" shares, both less income-tax, for the six months ended June 30. These dividends would amount to £2595; leaving £4407 to be carried forward. The sale of gas showed an increase of 5½ per cent. over the corresponding half of last year.

Montreal Water Supply.—Particulars are given in the "Monetary Times" as to the present condition of the water supply at Montreal. In the city itself, there is some shortage of water. The lower level reservoir is being repaired; and the water is down to a depth of 17 feet, which is 6 feet under normal. The contents are just now only 20 million gallons, or about 45 per cent. of what it should contain. There is not much danger from any of these sources at the present time, it is thought. The contract has been given out for a new 12-inch pump at the water-works, which will have a daily capacity of 12 million gallons. This will increase the city's total pumping capacity to 55 million gallons a day. The average consumption of water this year has been 42 million gallons a day; but the hot spell has caused these figures to mount. On the 6th ult., there were 47 million gallons used; on Aug. 5, a total of 48 millions flowed through the city taps; and the day previous, Aug. 4, saw a consumption of 46½ million gallons.

South Staffordshire Water-Works Company.—The report adopted at the half-yearly meeting of the South Staffordshire Water-Works Company stated that the number of houses laid on in the six months to June 30 was 642, making the total supplied 140,583. The gross amount of water-rates for the half year was £75,745, against £72,618 in the corresponding period of the previous year. The amount remaining for division was £30,254; and the Directors recommended the declaration of a dividend for the six months on the ordinary stock at the rate of 6½ per cent. per annum, less income-tax. After this, there would remain £9155 to be carried forward. The Chairman (Alderman G. C. Beale) pointed out that the water-rates had increased by over £3000. This was much more than the average rate of growth, and was due to a large extent to the exceptional drought. Their engineering staff had coped with the extraordinary demands without the slightest hitch; and in no district was there any serious complaint of shortage of water, though on the extremely high levels it was not possible to keep up a 24-hours' supply.



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Sale of the Silvertown Gas-Works Site.—The "Co-Partners' Magazine" of the Gaslight and Coke Company for the current month reports that the site of the disused Silvertown station of the Company has been disposed of. On this site originally stood the works of the Victoria Docks Gas Company, long since acquired. For some years it was used as a coal-testing station, until the modern advance and variety in carbonizing practice rendered the once standard plant out of keeping with the equipment of the working stations. It was managed by Mr. J. Wilton, in conjunction with Bow Common. Work there was finally stopped in September, 1909.

The Berlin-Anhaltische Maschinenbau-Actien-Gesellschaft, referring to the article published last week (pp. 539-41) respecting mantles for incandescent gas-lamps made of artificial silk, ask us to mention that they are represented in England by Messrs. A. Hurst and Co.

At the next half-yearly meeting of the British Gaslight Company, Limited, the Directors propose to recommend, subject to audit, a dividend at the rate of 10 per cent. per annum, with a bonus of 5s. per share, for the six months ended the 30th of June, less income-tax, and payable in October.

The annual abstract of accounts for the Borough of Blackpool, prepared by the Treasurer, and issued to members of the Council last week, shows that the profit on the gas undertaking for the past financial year amounted to £13,923; while the electric lighting department had a profit of £5270.

Messrs. Silcock and Tongue, of Birmingham, have sent a copy of their eighteenth catalogue of lamps—containing many new designs in advertising and sign lamps, also for street, hotel, and shop-window lighting. The lamps for gas-lighting are shown provided with fittings and connections complete, ready for fixing; and most of the lamps listed can be adapted for acetylene or electric lights.

A few evenings ago, a singular occurrence attracted a large crowd in Broad Street, Teddington. A dense column of black smoke was seen to be issuing from a gully of the surface-water drain. The Chief Officer of the Fire Brigade was soon on the spot; but as it was found that the cause of the smoke was the fusing of the electric light cable, the brigade were not called out. The smoke continued to pour from the gully for upwards of half-an-hour, and then gradually subsided. The following morning, a gang of men belonging to the Electric Light Company effected the necessary repairs.

In the industrial section of the Burton-upon-Trent Flower Show, the Corporation Gas Department exhibited a number of cooking-stoves of the pattern supplied to prepayment meter consumers, and a selection of artistic and up-to-date gas fires and radiators. There were also gas irons, a "Sun" boiler, a "Garajo" boiler (for heating greenhouses, garages, &c.), and a Sugg's anti-vibrator burner fitting. Most of the goods displayed were supplied by Messrs. John Wright and Co. The Richmond Gas Stove and Meter Company also furnished one of their "Daisy" boilers fitted up for heating greenhouses, &c.

A supply of gas has been afforded by the Gas Commitee of the Burton-on-Trent Corporation to Stretton—a neighbouring village containing about 150 houses; and with the view of directing attention to the matter, Miss Edith M. Smith, who has recently been engaged by the Committee to give demonstrations in cookery, attended at the Church Schools on Monday afternoon and evening last week, and showed to a numerous audience how to use a gas cooking-stove to the best advantage. Her methods of saving gas in culinary operations were followed with much interest. It was arranged that dainty and simple meals would be prepared next day.

A flower and vegetable show and a garden *fête* were held on the Metrogas Sports Ground in the Old Kent Road on Saturday, the 26th ult. The arrangements were carried out by a Committee, of which Mr. A. G. Manley was the Chairman and Mr. G. H. Peedle the Hon. Secretary. The exhibition was opened by Mr. F. M'Leod, the Secretary of the South Metropolitan Gas Company, who said that though it was the first attempt to hold such a show, he hoped it would not be the last, because he regarded it as the means of bringing the men more closely together; and it was this spirit which encouraged co-partnership. Rivalry of this sort brought out the best in a man. He was accorded a hearty vote of thanks. The prizes were distributed by Mrs. Gibson, wife of the Works Superintendent. During the afternoon, sports were held under the direction of Mr. A. C. Griesbach; and in the evening there was dancing to the music of the Company's band.

APPLICATIONS FOR LETTERS PATENT.

18,740.—Moore, G., "Ornamentation devices for gas-fittings." Aug. 21.
18,744.—Rollason, A., "Manufacture of gas from coal." Aug. 21.
18,748.—Carmichael, D., and Winning, J. F. F., "Leak-finder." Aug. 21.
18,753.—Goodyear, G. W. & E. F., "Metallic tubes." Aug. 21.
18,801.—Cremer, H., and Heinrichs, P., "Determining and measuring leakages in conduits." Aug. 21.
18,840.—Coventry, W., "Inverted burners." Aug. 22.
18,844.—Boyd, A., "Operating valves." Aug. 22.
18,851.—Lucas, H., and Edwards, W. H., "Flexible pipes." Aug. 22.
18,905.—Kennedy, R., "Water-meters." Aug. 23.
18,910.—Cook, T., "Gas-taps." Aug. 23.
18,917.—Valentine, H. S., "Gas-fires." Aug. 23.
18,936.—Blaugas Patent G. M. B. H., "Manufacture of liquid illuminating gas." Aug. 23.
18,973.—Titterton, F., "Compressors and exhausters." Aug. 24.
18,976.—Hacking, R., "Igniting gas-lamps." Aug. 24.
18,995.—Milne, J., "Meters for gas, &c." Aug. 24.
19,049.—Low, A. M., "Ignition of gas." Aug. 25.
19,051.—Macklow-Smith, A., and Pullen, W. W. F., "Gas-calorimeters." Aug. 25.
19,063.—Allin, H. P. & J. M., "Heating water by gas." Aug. 25.
19,074.—Allan, H., "Incandescent gas-fittings." Aug. 25.

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WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments Vacant.

SECOND ASSISTANT (Gas Department), Singapore Municipal Commissioners. Applications by Sept. 15.
JUNIOR ASSISTANT, East Hull Gas Company.
WORKING MANAGER. Hawkhurst Gas Company.

Appointment Wanted.

CLERK. "Z." c/o Streets.

Patent Licenses, &c.

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"IMPROVEMENTS IN METERS." Haseltine, Lake, and Co., Southampton Buildings, Chancery Lane, W.C.

TENDERS FOR

Coke.

WANDSWORTH AND PUTNEY GAS COMPANY. Tenders by Sept. 18.

Glass Panes for Street Lanterns.

CALCUTTA CORPORATION. Tenders by Oct. 9.

Jena Glass Cylinders.

CALCUTTA CORPORATION. Tenders by Oct. 9.

A Handsome F'Cap Volume giving a complete account of the

GRANTON GAS-WORKS

OF THE EDINBURGH AND LEITH CORPORATIONS' GAS COMMISSIONERS,

Their DESIGN, CONSTRUCTION, and EQUIPMENT,

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BY W. R. HERRING, M.Inst.C.E., &c.

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TAR PRODUCTS PRICES.

Representative manufacturers give the following as fair current values for the week ending Sept. 2. Prices are net, and they include the usual packages and delivery f.o.b., f.a.s., or f.o.r., as customary.

Article.	Basis.	London.	North-East Coast.	East Coast, Yorks.	West Coast.		Glasgow.
					Liverpool.	Manchester.	
Tar, crude	per ton	—	20/- 25/-	21/- 25/-	—	21/- 24/-	—
Pitch	"	42/6	40/-	40/-	40/-	39/- 39/6	40/-
Benzol, 90%	per gallon	—	-/9½ -/10	-/9½	-/9¼	-/9¼ -/9½	-/10
Benzol, 50-90%	"	—	-/10	-/9	—	-/9	—
Toluol, 90%	"	—	-/10	-/9	-/10	-/10	-/10
Crude naphtha, 30%	"	—	-/4¼	-/3¾	-/3¾	-/3¾	—
Light oil, 50%	"	—	-/3⅝	-/3½ -/3¾	-/3⅝	-/3⅝	—
Solvent naphtha, 90-160	"	—	-/10 -/10½	-/10	-/10	-/10	-/11
Heavy naphtha, 90-190	"	—	-/11	-/11	-/11¼	-/11¼	-/11
Creosote in bulk	"	-/2¾	-/2 3/16	-/2⅛	-/2⅛	-/2 3/16	-/2
Heavy oils	"	—	-/2½ -/2⅝	-/2¼	-/2¾	-/2¾	-/2¾
Carbolic acid, 60's	"	—	2/1	2/3	—	—	2/3
Naphthalene, crude drained salts	per ton	—	43/9	42/6	47/6	47/6 50/-	—
" pressed	"	—	60/-	63/-	60/-	60/- 72/6	—
" whizzed	"	—	—	—	70/- 72/6	65/- 75/-	62/6
Anthracene	per unit	-/2	-/1½	-/1½	-/1¼	-/1¼	—

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 585.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,551,868	Stk.	Apl. 12	5	Alliance & Dublin Ord.	81—84	..	5 19 1
374,000	Stk.	July 14	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
250,000	5	May 12	7	Bombay, Ltd.	6¼—6½	..	5 3 8
50,000	10	Aug. 31	15	Bourne-) 10 p.c.	28½—29½*	..	5 1 8
311,810	10	"	7	mouth Gas) B 7 p.c.	16½—16¾*	..	4 3 7
75,000	10	"	6	and Water) Pref. 6 p.c.	14¼—14¾*	..	4 1 4
380,000	Stk.	Aug. 16	13	Brentford Consolidated	256—261	..	4 19 7
330,000	"	"	10	Do. New	198—203	..	4 18 6
50,000	"	"	5	Do. 5 p.c. Pref.	120—122	..	4 2 0
206,250	"	June 15	4	Do. 4 p.c. Deb.	97—99	..	4 0 10
220,000	Stk.	Aug. 31	11	Brighton & Hove Orig.	216—221*	+2½	4 19 7
246,320	"	"	8	Do. A Ord. Stk.	156—159*	+1	5 0 8
490,000	20	Apl. 12	12½†	British	45—46	..	5 8 8
120,000	Stk.	June 30	4	Do. 4 p.c. Deb. Stk.	94—96	..	4 3 4
109,000	"	Aug. 16	6	Bromley, A 5 p.c.	115—120	+2	5 0 0
165,700	"	"	4½	Do. B 3½ p.c.	85—90	+1½	5 0 0
82,278	"	"	5½	Do. C 5 p.c.	105—110	+3½	5 0 0
55,000	"	June 30	3½	Do. 3½ p.c. Deb.	82—84	..	4 3 4
250,000	Stk.	"	4	Buenos Ayres 4 p.c. Deb.	95—97	..	4 2 6
100,000	10	—	—	Cape Town & Dis., Ltd.	2—3	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	4—5	..	—
100,000	Stk.	June 30	4½	Do. 4½ p.c. Deb. Stk.	80—83	..	5 8 5
157,150	Stk.	Aug. 16	5	Chester 5 p.c. Ord.	107—109	..	4 11 9
1,513,280	Stk.	"	5/9/4	Commercial 4 p.c. Stk.	111½—113½	..	4 16 1
560,000	"	"	5½	Do. 3½ p.c. do.	105½—107½	..	4 19 3
475,000	"	June 15	3	Do. 3 p.c. Deb. Stk.	76—78	..	3 16 11
800,000	Stk.	May 31	4	Continental Union, Ltd.	88—92	..	4 7 0
200,000	"	"	7	Do. 7 p.c. Pref.	135—137	..	5 2 2
492,270	Stk.	—	5½	Derby Con. Stk.	122—124	..	4 8 9
55,000	"	—	4	Do. Deb. Stk.	104—105	..	3 16 2
840,150	10	July 28	10	European, Ltd.	18½—19½	..	5 2 7
16,160,600	Stk.	Aug. 16	4/14/8	Gas-) 4 p.c. Ord.	106—107	..	4 8 5
2,600,000	"	"	3½	light) 3½ p.c. max.	83—85	..	4 2 4
4,062,235	"	"	4	and) 4 p.c. Con. Pref.	101—103	..	3 17 8
4,531,705	"	June 15	3	Coke) 3 p.c. Con. Deb.	79—81	+½	3 14 1
258,740	Stk.	Mar. 10	5	Hastings & St. L. 3½ p.c.	96—98	+1	5 2 0
82,500	"	"	6½	Do. do. 5 p.c.	—	..	—
70,000	10	Apl. 27	11	Hongkong & China, Ltd.	17½—18	..	6 2 2
131,000	Stk.	Mar. 10	7½†	Ilford A and C	148—152	+1½	4 18 8
65,780	"	"	6†	Do. B	121—124	+2	4 16 9
65,500	"	June 30	4	Do. 4 p.c. Deb.	94—96	..	4 3 4
4,940,000	Stk.	May 12	9	Imperial Continental	180—183	..	4 18 4
1,235,000	Stk.	Aug. 16	3½	Do. 3½ p.c. Deb. Red.	90—92	..	3 16 1
£			p.c.				£ s. d.
200,242	Stk.	Aug. 31	6	Lea Bridge Ord. 5 p.c.	118—120*	+1	5 0 0
561,000	Stk.	Aug. 16	10	Liverpool United A.	210—212	..	4 14 4
718,100	"	"	7	Do. B.	161½—163½	+1½	4 5 8
306,083	"	June 30	4	Do. Deb. Stk.	102—104	..	3 16 11
75,000	5	June 15	6	Malta & Mediterranean	4⅜—5	..	6 0 0
560,000	100	Apl. 1	5	Met. of) 5 p.c. Deb.	101—103	+1	4 17 1
250,000	100	"	4½	Melbourne) 4½ p.c. Deb.	101—103	+1	4 7 5
541,920	20	May 31	3½	Monte Video, Ltd.	12¾—13¼	..	5 5 8
1,775,892	Stk.	July 28	4½	Newc'tle&G'tesh'd Con.	103—105	..	4 3 4
529,705	Stk.	June 30	3½	Do. 3½ p.c. Deb.	87—89	..	3 18 8
55,940	10	Aug. 31	7	North Middlesex 7 p.c.	14½—15½*	..	4 10 4
300,000	Stk.	Apl. 27	8	Oriental, Ltd.	138—140	..	5 14 4
60,000	5	Apl. 12	8	Ottoman, Ltd.	6⅜—7¼	..	5 10 4
31,800	53	Aug. 16	13	Portsea Island A	132—136	..	5 1 0
60,000	50	"	13	Do. B	122—125	..	5 4 0
100,000	50	"	12	Do. C	117—122	..	4 18 4
398,490	5	May 31	8	Primitiva Ord.	7⅛—7⅝	..	5 6 8
796,980	5	June 30	5	Do. 5 p.c. Pref.	5⅛—5⅝	..	4 10 11
488,900	100	June 1	4	Do. 4 p.c. Deb.	97—99	..	4 0 10
312,650	Stk.	June 30	4	River Plate 4 p.c. Deb.	95—97	..	4 2 6
250,000	10	Mar. 24	9	San Paulo, Ltd.	21⅛—22⅛	..	4 0 0
115,000	10	"	6	Do. 6 p.c. Pref.	12—12½	..	4 16 0
125,000	50	July 1	5	Do. 5 p.c. Deb.	49½—50½	..	4 19 0
135,000	Stk.	Mar. 24	10	Sheffield A	239—241	..	4 3 0
209,984	"	"	10	Do. B	238—240	..	4 3 4
523,500	"	"	10	Do. C	238—240	..	4 3 4
70,000	10	June 15	7	South African	8½—9½	..	7 7 4
6,429,895	Stk.	Aug. 16	5/9/4	South Met., 4 p.c. Ord.	116½—118½	..	4 12 2
1,895,445	"	July 14	3	Do. 3 p.c. Deb.	78½—80½	..	3 14 6
209,820	Stk.	Aug. 16	8½	South Shields Con. Stk.	150—152½	..	5 11 10
605,000	Stk.	"	5⅝	S'th Suburb'n Ord. 5 p.c.	117½—119	..	4 14 9
60,000	"	"	5	Do. 5 p.c. Pref.	115½—117½	..	4 5 1
117,058	"	July 14	5	Do. 5 p.c. Deb. Stk.	121—123	..	4 1 4
502,310	Stk.	May 12	5	Southampton Ord.	108—110	..	4 10 11
120,000	Stk.	Aug. 16	7½	Tottenham) A 5 p.c.	144—147	..	4 17 0
483,940	"	"	5⅝	and) B 3½ p.c.	114—116	..	4 17 0
149,470	"	June 15	4	Edmonton) 4 p.c. Deb.	96—98	..	4 1 8
182,380	10	June 15	8	Tuscan, Ltd.	8⅜—9¼	..	8 13 0
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	96—98	..	5 2 0
236,476	Stk.	Aug. 16	5	Tynemouth, 5 p.c. max.	113—115	..	4 6 11
255,636	Stk.	Aug. 31	6⅞	Wands-) B 3½ p.c.	142—145*	+1½	4 14 10
85,766	"	June 30	3	worth) 3 p.c. Deb. Stk.	71—73*	..	4 2 2

Prices marked * are "Ex. div." † Next dividend will be at this rate.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

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Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

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